

PUC 1-16 (Electric)

Request:

Please provide the capital authorization and closing reports for all projects begun or finished since January 1, 2013 of \$250,000 or more in magnitude.

Response:

The Company has provided the information requested in three separate attachments based on the types of projects used during the time period specified:

- 1) **Attachment 1-16-1 (Electric) – Specific Projects:** Specific Projects are used for capital work of a defined scope and are closed once the work is completed. Projects are authorized for the expected total cost to complete the work and re-authorized for any unexpected changes in cost which may occur.
- 2) **Attachment 1-16-2 (Electric) – Blanket Projects:** The Company utilizes perennial blanket projects to initiate, monitor, and report on relatively smaller, routine work under \$100,000 in value. The blanket projects are set-up for each budget classification (New Business, Public Requirements, Damage/Failure, etc) and the amount of funding approved each year is based on historic costing trends, input from local Operations, and a forecasted impact of inflationary and economic conditions on costs. All Blanket projects are approved within one USSC Sanction Paper annually and the approval amount is reviewed/reset each fiscal year.
- 3) **Attachment 1-16-3 (Electric) – Program Projects:** Program projects are similar to Blanket Projects but are more narrow in their focus. While Blanket Projects are set up at the Budget Classification level, a program is more narrowly defined for a certain type of work within a budget classification. Examples include the Inspection & Maintenance Program (Asset Replacement), Major Storms (Damage/Failure), Overloaded Line Transformers (Load Relief), etc. Programs Projects remain open until the program is completed and are budgeted and approved annually. The budget is based on many factors including the program's goals, priority, resource and material availability, etc.

| Project # | Project Description | Project Type | Page Reference |
|-----------|---|-------------------------|------------------|
| C005414 | Farnum Pike Sub_115 kV Dist Assets Total | Distribution Substation | Page 5 of 1643 |
| C015158 | Newport Substation (D-Sub) Total | Distribution Substation | Page 48 of 1643 |
| C020297 | Sac AB Repl Prog Phase 7 NEC DxT Total | Distribution Substation | Page 80 of 1643 |
| C023852 | Inst Ductline Governor St. Prov. Total | Distribution Line | Page 92 of 1643 |
| C024175 | Chase Hill Sub (D_Line) Total | Distribution Line | Page 107 of 1643 |
| C024176 | Chase Hill Sub (D-Sub) Total | Distribution Substation | Page 141 of 1643 |
| C024179 | Coventry MITS (Dist Sub) Total | Distribution Substation | Page 175 of 1643 |
| C028628 | Newport SubTrans & Dist Conversion Total | Distribution Line | Page 185 of 1643 |
| C028851 | Recon. 38F5 and 2227 Greenville Ave Total | Distribution Line | Page 217 of 1643 |
| C028884 | Install Johnston 18F10 Feeder Total | Distribution Line | Page 223 of 1643 |
| C028920 | New London Ave (D-Sub) Total | Distribution Substation | Page 233 of 1643 |
| C028921 | New London Ave (D-Line) Total | Distribution Line | Page 261 of 1643 |
| C028932 | Recon. 0.5 Miles Segment of 2232 Total | Distribution Line | Page 289 of 1643 |
| C032258 | ACNW Vlt47 Full Rebuild Prov Total | Distribution Line | Page 293 of 1643 |
| C033535 | Johnston Sub 12.47 kV Expansion Total | Distribution Substation | Page 304 of 1643 |
| C034002 | Johnston Sub 12kV Expansion Getawa. Total | Distribution Line | Page 314 of 1643 |
| C035087 | DOTR-Apponaug Circulator Imprv Warw Total | Distribution Line | Page 324 of 1643 |
| C036072 | Johnston #18 Substation Expansion Total | Distribution Substation | Page 335 of 1643 |
| C036093 | Elmwood#7Replace 23KV Groun Bank Total | Distribution Substation | Page 345 of 1643 |
| C036230 | Langworthy Substation (D-Sub) Total | Distribution Substation | Page 353 of 1643 |
| C036397 | Clarkson - new 13F10 feeder (line) Total | Distribution Line | Page 363 of 1643 |
| C036450 | 83F2 Load Relief - New Fdr (Dline) Total | Distribution Line | Page 372 of 1643 |
| C036516 | Kilvert St 87 - New Fdr (DLine) Total | Distribution Line | Page 378 of 1643 |
| C036522 | Kilvert St 87 - Install TB#2 Total | Distribution Substation | Page 390 of 1643 |
| C043085 | D/F Sockanosset #2 TRF Total | Distribution Substation | Page 409 of 1643 |
| C044972 | LN13_Paving and sewer Total | Facilities/IT/Telcom | Page 418 of 1643 |
| C045657 | DOTR-Repl Bridges No.475 & 476 E.P. Total | Distribution Line | Page 422 of 1643 |
| C045680 | MELR13_Replace windows Total | Facilities/IT/Telcom | Page 428 of 1643 |
| C046352 | Volt Var Dline RI Pilot Project Total | Distribution Line | Page 443 of 1643 |
| C046386 | BITS Wakefield Sub Upgrades (D-Sub) Total | Distribution Substation | Page 467 of 1643 |
| C046397 | Fdr 1109A - Install Cable Dorrance Total | Distribution Line | Page 495 of 1643 |
| C046398 | Memorial Blvd Easton's Beach inst d Total | Distribution Line | Page 499 of 1643 |
| C046399 | Fdr 1103 Inst Cable So Main St Prov Total | Distribution Line | Page 508 of 1643 |
| C046400 | Capital Ctr Fdrs - Elim T-body join Total | Distribution Line | Page 514 of 1643 |
| C046405 | Fdr 1113 Inst Cable Fountain St Pro Total | Distribution Line | Page 523 of 1643 |
| C046406 | Fdr 1109B Inst Cable Pine St & west Total | Distribution Line | Page 529 of 1643 |
| C046506 | Tunk Hill Road, Scituate RI, Storm Total | Distribution Line | Page 535 of 1643 |
| C046697 | Hope Substation Flood Restoration Total | Distribution Substation | Page 544 of 1643 |
| C046831 | CLARKE 65J12 Feeder Upgrade (D-Sub) Total | Distribution Substation | Page 548 of 1643 |
| C046832 | CLARKE St Feeder Upgrades (D-Line) Total | Distribution Line | Page 557 of 1643 |
| C047377 | IRURD Wethersfield Commons Total | Distribution Line | Page 566 of 1643 |
| C047396 | IRURD Silver Maple Drive Total | Distribution Line | Page 577 of 1643 |
| C047397 | IRURD Cedarhurst. Total | Distribution Line | Page 583 of 1643 |
| C047422 | IRURD Maplewood Total | Distribution Line | Page 589 of 1643 |
| C047495 | DG SVC OCI Solar RI-233 Total | Distribution Line | Page 600 of 1643 |

| Project # | Project Description | Project Type | Page Reference |
|-----------|--|-------------------------|-------------------|
| C048596 | Kents Corner - Replace VRs Total | Distribution Substation | Page 633 of 1643 |
| C048687 | LIN13_ Renovate Lincoln Ops Center Total | Facilities/IT/Telcom | Page 639 of 1643 |
| C048717 | DOTR-EMain/WMain Int Recon Total | Distribution Line | Page 657 of 1643 |
| C049140 | Randall St Bridge Ductline. Prov Total | Distribution Line | Page 663 of 1643 |
| C049681 | Clarkson - EMS Expansion Total | Distribution Substation | Page 669 of 1643 |
| C049682 | Warwick 52 - EMS Expansion Total | Distribution Substation | Page 675 of 1643 |
| C049726 | UG Fdrs 1141-1143 Hurr Barrier Prov Total | Distribution Line | Page 681 of 1643 |
| C049910 | Southeast Sub MC Retirement (DLine) Total | Distribution Line | Page 687 of 1643 |
| C049981 | Nsnvle 127W41 New Customer Load Total | Distribution Line | Page 703 of 1643 |
| C050006 | Hyde Ave MC Retirement (D-Line) Total | Distribution Line | Page 712 of 1643 |
| C050017 | Daggett Ave MC Retirement (D-Line) Total | Distribution Line | Page 726 of 1643 |
| C050699 | Hopkins Hill #63 - EMS Expansion Total | Distribution Substation | Page 735 of 1643 |
| C051202 | 13F1 Elim T-Body Joints Prov Total | Distribution Line | Page 741 of 1643 |
| C051203 | LNG Plant Svc Terminal Rd Prv DLine Total | Distribution Line | Page 745 of 1643 |
| C051204 | LNG Plant Svc Terminal Rd Prv DSub Total | Distribution Substation | Page 759 of 1643 |
| C051212 | South St repl indoor subst D-SUB Total | Distribution Substation | Page 773 of 1643 |
| C051213 | South St repl indoor subst D-LINE Total | Distribution Line | Page 804 of 1643 |
| C051385 | Central Falls Sub Relief Total | Distribution Line | Page 836 of 1643 |
| C051496 | Toray Plastics (12.5MW GT) Total | Distribution Substation | Page 847 of 1643 |
| C051625 | South Street Transformer Spare. Total | Distribution Substation | Page 853 of 1643 |
| C051824 | Lafayette Sub Transformer Replaceme Total | Distribution Substation | Page 859 of 1643 |
| C052686 | Prov RI Survey/Repl UG sec. cables Total | Distribution Line | Page 874 of 1643 |
| C052964 | IRURD Rollingwood Total | Distribution Line | Page 878 of 1643 |
| C053111 | Volt Var - IT/IS Total | Facilities/IT/Telcom | Page 890 of 1643 |
| C053266 | NW Vlt 122 Kinsley Bldg, Prov. Total | Distribution Line | Page 914 of 1643 |
| C053268 | Pawtucket No 1 Bus Sect 73 Relief Total | Distribution Line | Page 920 of 1643 |
| C053646 | Quonset Sub Expansion (D-Sub) Total | Distribution Substation | Page 931 of 1643 |
| C053647 | Quonset Sub Expansion (D-Line) Total | Distribution Line | Page 949 of 1643 |
| C053964 | Nasonville TRF LTC Damage/failure. Total | Distribution Substation | Page 967 of 1643 |
| C054005 | SHARPE BUILDING ASSC-Foundry Bld 4 Total | Distribution Line | Page 973 of 1643 |
| C054012 | MELR15_ Renovations PHASE 1 Total | Facilities/IT/Telcom | Page 979 of 1643 |
| C054323 | Franklin Square Breaker Replacement Total | Distribution Substation | Page 993 of 1643 |
| C054666 | MELR15_ Light Stores Roof Replacemen Total | Facilities/IT/Telcom | Page 999 of 1643 |
| C054788 | ValleySub 102 NERC CIP v3.25 Total | Distribution Substation | Page 1005 of 1643 |
| C054909 | Warwick Mall Trf 2 Failure Total | Distribution Substation | Page 1011 of 1643 |
| C054929 | Fox Pl, Providence, RI Total | Distribution Line | Page 1015 of 1643 |
| C055268 | AMGEN 35 kV-Second Feeder Service Total | Distribution Line | Page 1021 of 1643 |
| C055357 | RI UG Cable Repl Program - Fdr 1111 Total | Distribution Line | Page 1043 of 1643 |
| C055359 | RI UG Cable Repl Program - Fdr 79F1 Total | Distribution Line | Page 1052 of 1643 |
| C055367 | RI UG Cable Repl Program Fdr 54K21 Total | Distribution Line | Page 1056 of 1643 |
| C055369 | RI UG Cable Repl Program Fdr 54K23 Total | Distribution Line | Page 1065 of 1643 |
| C057169 | RI Streetlighting & Controls Pilot Total | Distribution Line | Page 1069 of 1643 |
| C058179 | General Dynamics, N Kingstown RI Total | Distribution Line | Page 1075 of 1643 |
| C058287 | IRURD Ferncliffe Farms URD Total | Distribution Line | Page 1081 of 1643 |
| C059539 | MELR15_ Renovations PHASE 2 Total | Facilities/IT/Telcom | Page 1092 of 1643 |

| Project # | Project Description | Project Type | Page Reference |
|-----------|---|-------------------------|-------------------|
| C059579 | Fdr 3324 Install Cable Transf Leads Total | Distribution Substation | Page 1102 of 1643 |
| C059882 | Flood Contingency Plan NECO - D Total | Distribution Substation | Page 1108 of 1643 |
| C061711 | MDT16_ Facility Purchase Total | Facilities/IT/Telcom | Page 1124 of 1643 |
| C061986 | Moses Brown School, Providence RI Total | Distribution Line | Page 1136 of 1643 |
| C063246 | Franklin Sq Fire Escape Replacement Total | Distribution Substation | Page 1142 of 1643 |
| C063546 | MELR16_ Renovations PHASE 3 Total | Facilities/IT/Telcom | Page 1148 of 1643 |
| C064266 | Clarkson St New Feeder 13F10 Total | Distribution Substation | Page 1157 of 1643 |
| C065470 | Recloser Communication Upgrade - RI Total | Distribution Line | Page 1163 of 1643 |
| C068686 | Franklin Sq Breaker Replacements Total | Distribution Substation | Page 1173 of 1643 |
| C069711 | Franklin Square Protection Scheme Total | Distribution Substation | Page 1190 of 1643 |
| C070026 | New Svc Bs Eagle St Providence RI Total | Distribution Line | Page 1196 of 1643 |
| C070246 | IRURD Immokolee Dr, Portsmouth Total | Distribution Line | Page 1202 of 1643 |
| C070466 | Valley #102 22T Replacement D/F Total | Distribution Substation | Page 1206 of 1643 |
| C072027 | INVP 4055 - RI Renewable Energy Total | Facilities/IT/Telcom | Page 1219 of 1643 |
| C072689 | 350 Eddy St, Providence Total | Distribution Line | Page 1236 of 1643 |
| C075445 | RI Royal Disconnect Replacement Total | Distribution Substation | Page 1242 of 1643 |
| C075860 | Geneva Sub Equipment Replacement Total | Distribution Substation | Page 1246 of 1643 |
| C076923 | RI VVO/CVR Feeder Licenses Total | Facilities/IT/Telcom | Page 1251 of 1643 |
| C077042 | LINC17_ Backup Control Total | Facilities/IT/Telcom | Page 1268 of 1643 |
| CD00002 | Miriam Hospital Second Feeder Servi Total | Distribution Line | Page 1280 of 1643 |
| CD00135 | I-195 Contract 14 - Providence Total | Distribution Line | Page 1289 of 1643 |
| CD00518 | Spare Transformer - Peacedale & 8 o Total | Distribution Substation | Page 1303 of 1643 |
| CD00526 | EMS Add-Peacedale 59 RI Total | Distribution Substation | Page 1307 of 1643 |
| CD00528 | EMS Expansion - Natick 29 Substatio Total | Distribution Substation | Page 1313 of 1643 |
| CD00529 | EMS Expansion - Hospital Sub 146 Total | Distribution Substation | Page 1319 of 1643 |
| CD00530 | EMS Expansion - Elmwood Outdoor 7 Total | Distribution Substation | Page 1325 of 1643 |
| CD00531 | EMS Expansion - Division Street 61 Total | Distribution Substation | Page 1331 of 1643 |
| CD00533 | EMS Expansion - Lincoln Ave 72 Total | Distribution Substation | Page 1337 of 1643 |
| CD00534 | EMS Expansion - Old Baptist 46 Total | Distribution Substation | Page 1346 of 1643 |
| CD00641 | Retire Pawtuxet Substation (D-Line) Total | Distribution Line | Page 1352 of 1643 |
| CD00648 | Eldred Sub Asset Replacement (D-Sub Total | Distribution Substation | Page 1358 of 1643 |
| CD00649 | Gate 2 Substation (D-Sub) Total | Distribution Substation | Page 1367 of 1643 |
| CD00659 | Eldred Sub Asset Replacement(D-Lin Total | Distribution Line | Page 1399 of 1643 |
| CD00686 | IRURD Carriage Drive Total | Distribution Line | Page 1408 of 1643 |
| CD00696 | Mobile Sub - Replace MSID#9734 Total | Distribution Substation | Page 1414 of 1643 |
| CD00722 | New Shun Pike Substation - 23kV Lin Total | Distribution Line | Page 1422 of 1643 |
| CD00723 | New Shun Pike Substation-23kV Sub Total | Distribution Substation | Page 1438 of 1643 |
| CD00766 | I-195 Contract 15 - Providence Total | Distribution Line | Page 1454 of 1643 |
| CD00824 | Radio Improvement Project. Total | Facilities/IT/Telcom | Page 1468 of 1643 |
| CD00827 | IRURD South Rd Est So. Kingstown Total | Distribution Line | Page 1477 of 1643 |
| CD00916 | Wood River - EMS Expansion Total | Distribution Substation | Page 1483 of 1643 |
| CD00937 | IRURD Village Green Rehab Total | Distribution Line | Page 1489 of 1643 |
| CD00972 | New Highland Drive Substation - DSu Total | Distribution Substation | Page 1498 of 1643 |
| CD00978 | New Highland Drive Substation - DLi Total | Distribution Line | Page 1521 of 1643 |
| CD00997 | ACNW Vault 34 Reconstruction Prov Total | Distribution Line | Page 1544 of 1643 |

| Project # | Project Description | Project Type | Page Reference |
|-----------|---|-------------------------|-------------------|
| CD01093 | KENTS CORNER transformer contingenc Total | Distribution Line | Page 1550 of 1643 |
| CD01097 | Warwick Mall Substation Flood Resto Total | Distribution Substation | Page 1556 of 1643 |
| CD01101 | Kent County 2nd Transformer (D-Sub) Total | Distribution Substation | Page 1564 of 1643 |
| CD01102 | Hunt River Substation Retirement Total | Distribution Substation | Page 1592 of 1643 |
| CD01194 | Repl Padmt Swgr mult locns 79F1-13F Total | Distribution Line | Page 1620 of 1643 |
| CD01242 | Pontiac Substation Flood Restoratio Total | Distribution Substation | Page 1626 of 1643 |
| CD01243 | Pontiac Substation Flood Restoratio Total | Distribution Line | Page 1635 of 1643 |

C003693

Woonsocket Sub New 115/13 kV Sub

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPlan Help Calc Print Win

Funding Project Estimates - Summary C003693 Current Total Authorized Amount: \$5,10...

Title
Project Number

| | |
|-----------------------|---------------------------------|
| Budget Version | Default (active) |
| Revision | <input type="text"/> |
| Revision Status | Approved |
| Revision No. | <input type="text" value="28"/> |
| Est Start Date | 04/01/2004 |
| Est Complete Date | 01/01/2013 |
| Est In Srvc Date | 11/30/2012 |
| Capital | \$4,965,000.00 |
| Expense | \$55,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$80,000.00 |
| Total (excl. Ret.) | \$5,100,000.00 |
| Credits | \$0.00 |
| Net | \$5,100,000.00 |

Revision Info

Revision of 28

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for
Critical Energy Infrastructure Information.

5360-Narragansett Electric and Gas Project Revision Detail Report

| | | | |
|-----------------------------|---|------------------------|----------------------|
| Fund Project Number: | <u>C003693</u> | USSC #: | <u>USSC0408P31R1</u> |
| Revision: | <u>28</u> | Budget Version: | <u>Default</u> |
| Project Title: | <u>Woonsocket Sub New 115/13 kV Sub</u> | | |
| Project Description: | <u>03857 Woonsocket Sub New 115/13 kV Sub</u> | | |

| | | | |
|-----------------------------|--------------------------|----------------------------------|--------------------------------------|
| Project Status: | <u>Closed</u> | | |
| Responsible Person: | <u>MAXIMOVICH, GEOR</u> | Initiator: | <u>PowerBatch,</u> |
| Spending Rationale: | <u>Asset Condition</u> | Funding Type: | <u>P Dist by Transmission Sub RI</u> |
| Budget Class: | <u>Asset Replacement</u> | | |
| Capital by Category: | | | |
| Program Code: | | | |
| Project Risk Score: | <u>41</u> | Project Complexity Score: | <u>29</u> |

Project Schedule / Expenditures

| | | | | | |
|-----------------------------|-----------------------|---------------------------|-----------------------|---------------------|-----------------------|
| Revision Status: | <u>Approved</u> | | | | |
| Est Start Date: | <u>4/1/2004</u> | Est Complete Date: | <u>1/1/2013</u> | | |
| Est In-Service Date: | <u>11/30/2012</u> | | | | |
| TTD Actuals: | <u>\$5,248,878</u> | As Of: | <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$4,965,000</u> | <u>\$55,000</u> | <u>\$80,000</u> | <u>\$5,100,000</u> | <u>\$0</u> |

Justification / Risk Identification:
Woonsocket substation # 26 is located in North Smithfield RI. Transmission Planning issued in 2007 a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to accommodate a low profile distribution substation. The 2009 Distribution Annual Plan confirmed the need of Woonsocket substation expansion and feeders addition.
This expansion will have the capacity and feeder connections to provide more feeders with District

Project Scope:
03857 Woonsocket Sub New 115/13 kV Sub. The project involves the addition at Woonsocket # 26 substation of a 115kV transmission tap, a 115kV circuit breaker, a 115 kV circuit switcher, a 115/13.8 kV [redacted] power transformer, a 13.8 kV metal-clad switchgear with four feeder positions, a metal enclosed [redacted] capacitor bank and getaway ducts and manhole system for four new 13.8 kV feeders. The main driver for this project is asset replacement, increased reliability, and load growth.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>5/8/2013 10:32:12</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

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US Sanction Paper



| | | | |
|---------------------------|---|--------------------------|----------------------|
| Title: | Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders | Sanction Paper #: | USSC0408P31R1 |
| Project #: | C03488, C03693, C24279, C15200 | Sanction Type: | Re-Sanction |
| Operating Company: | The Narragansett Electric Company | Date of Request: | 12/14/11 |
| Author: | Scott Sobolewski / George Maximovich | Sponsor: | Chris Root |
| Utility Service: | Electricity T&D | | |

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests the re-sanction of Project #'s C03488, C03693, C24279 and C15200 in the amount of \$10.630M and a tolerance of +/-10% to continue with construction to completion and closeout activities.

The re-sanction amount is \$10.630M broken down into:

- \$10.210M Capex
- \$ 0.183M Opex
- \$ 0.237M Removal

Note the originally requested sanction amount of \$9.400M and a tolerance of +/-10% was approved for \$4.400M in June 2009 for DxD projects and \$5.000M in February 2010 for TxT and DxT projects. The project is approximately 79% complete and \$8.390M has been spent to date. This paper is requesting approval for additional \$1.230M for a re-sanction approval of \$10.630M to allow completion and close out of this project.

1.2 Brief Description:

The project involves the addition at Woonsocket # 26 substation of a 115kV transmission tap, a 115kV circuit breaker, a 115 kV circuit switcher, a 115/13.8 kV [REDACTED] power transformer, a 13.8 kV metal-clad switchgear with four feeder positions, a metal enclosed [REDACTED] capacitor bank and getaway ducts and manhole system for four new 13.8 kV feeders. The main driver for this project is asset replacement, increased reliability, and load growth.

Woonsocket substation # 26 is located in North Smithfield RI. Transmission Planning issued in 2007 a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to



US Sanction Paper

accommodate a low profile distribution substation. The 2009 Distribution Annual Plan confirmed the need of Woonsocket substation expansion and feeders addition.

These new feeders will have the capacity and feeder configuration to provide strong feeder ties with Riverside 108W61 and 108W62. In addition, upon completion of this project, the temporary transformer currently in use at West Farnum will be removed and transferred back to the system transformer pool. Finally, the load relief provided from this project will also provide load relief to Nasonville 127 Substation and allow for the extension of a second feeder to Pascoag Municipality.

This paper requests a re-sanction due to additional scope as the project progressed during the final engineering and construction phase and an initially low construction estimate based on preliminary engineering documentation. This is detailed further in the Key Variances section of the paper.

1.3 Summary of Projects:

| Project Number | Project Title | Estimate Amount (\$M's) |
|----------------|---|-------------------------|
| C03488 | 115 kV Tap Woonsocket Sub New 115/13.8 kV | 0.580 |
| C03693 | Woonsocket Sub New 115/13 kV Sub | 5.100 |
| C24279 | Woonsocket Sub New 13 kV Sub/gear | 3.200 |
| C15200 | Woonsocket Substation #26 – Install Four New Distribution Feeders | 1.750 |
| Total | | 10.630 |

1.4 Associated Projects:

| Project Number | Project Title | Company | Estimate Amount (\$) |
|----------------|---------------|---------|----------------------|
| | | | |
| | | | |
| Total | | | \$ |



US Sanction Paper

1.5 Prior Sanctioning History (including relevant approved Strategies):

| Date | Governance Body | Sanctioned Amount | Paper Title | Sanction Type |
|-------------------|-----------------|-------------------|--|---------------|
| February 16, 2010 | AMIC | \$5.000M | Woonsocket Substation Reinforcements to Accommodate a New 115/13.8kV Distribution Substation | Sanction |
| June 10, 2009 | DCIG | \$4.400M | Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders. | Sanction |
| April 2, 2008 | DCIG | \$0.158M | Install a New 115/13.8 kV Distribution Substation and four feeders in Woonsocket Substation yard, RI | Strategy |
| May 22, 2007 | AMIC | \$2.700M | Strategy to Reinforce Greater Rhode Island Transmission System (Greater Rhode Island Transmission Study) | Strategy |

Over / Under Expenditure Analysis - C03488

| Summary Analysis (M's) | Capex | Opex | Removal | Total |
|------------------------|---------|---------|---------|---------|
| Latest approval | \$0.404 | \$0.028 | \$0.068 | \$0.500 |
| Re-Sanction Amount | \$0.480 | \$0.028 | \$0.072 | \$0.580 |
| Change* | \$0.076 | 0 | \$0.004 | \$0.080 |

Over / Under Expenditure Analysis – C03693

| Summary Analysis (M's) | Capex | Opex | Removal | Total |
|------------------------|---------|---------|---------|---------|
| Latest approval | \$4.365 | \$0.055 | \$0.080 | \$4.500 |
| Re-Sanction Amount | \$4.965 | \$0.055 | \$0.080 | \$5.100 |
| Change* | \$0.600 | \$0.000 | \$0.000 | \$0.600 |



US Sanction Paper

Over / Under Expenditure Analysis – C24279

| Summary Analysis (M's) | Capex | Opex | Removal | Total |
|------------------------|---------|---------|---------|---------|
| Latest approval | \$2.870 | \$0.030 | \$0.000 | \$2.900 |
| Re-Sanction Amount | \$3.165 | \$0.035 | \$0.000 | \$3.200 |
| Change* | \$0.295 | \$0.005 | \$0.000 | \$0.300 |

Over / Under Expenditure Analysis – C15200

| Summary Analysis (M's) | Capex | Opex | Removal | Total |
|------------------------|---------|---------|-----------|---------|
| Latest approval | \$1.290 | \$0.030 | \$0.180 | \$1.500 |
| Re-Sanction Amount | \$1.600 | \$0.065 | \$0.085 | \$1.750 |
| Change* | \$0.310 | \$0.035 | \$(0.095) | \$0.250 |

1.6 Next Planned Sanction Review:

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|----------------------------|
| November 2012 | Project Closure |

1.7 Category:

| Category | Reference to Mandate, Policy, or NPV Assumptions |
|---|---|
| <input type="checkbox"/> Mandatory | Distribution Planning Criteria Asset Replacement |
| <input checked="" type="checkbox"/> Policy-Driven | |
| <input type="checkbox"/> Justified NPV | |

1.8 Asset Management Risk Score
 C03488, C03693, C24279 & C15200
 Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

Reliability Environment Health & Safety

1.9 Complexity Level: (if applicable)

High Complexity Medium Complexity Low Complexity

Complexity Score: 29

US Sanction Paper



1.10 Business Plan:

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--|---|---|--|
| Dist- Current 5 year Spending Plan FY12-16 Budget | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.283M |
| Trans- Current 5 year Spending Plan FY12-16 Budget | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input type="checkbox"/> Over <input checked="" type="checkbox"/> Under | \$0.682M |

1.11 If cost > approved Business Plan how will this be funded?

N/A

1.12 Distribution Current Planning Horizon:

| Company Name | Current planning horizon | | | | | | | Total |
|-----------------------------|--------------------------|---------------|---------------|---------------|---------------|---------------|---------|----------|
| | Prior YR'S | Yr 1 11/12 | Yr 2 12/13 | Yr 3 13/14 | Yr 4 14/15 | Yr 5 15/16 | Yr 7 + | |
| Proposed Capex Investment | 4.090 | 4.864 | 0.776 | | | | | 9.730 |
| Proposed Opex Investment | 0.026 | 0.108 | 0.021 | | | | | 0.155 |
| Proposed Removal Investment | 0.001 | 0.145 | 0.019 | | | | | 0.165 |
| CIAC / Reimbursement | | | | | | | | 0.000 |
| Total | \$4.117 | \$5.117 | \$0.816 | \$0.000 | \$0.000 | \$0.000 | \$0.000 | \$10.050 |



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1.13 Transmission Current Planning Horizon:

| Company Name | Current planning horizon | | | | | | | Total |
|-----------------------------|--------------------------|---------------|---------------|---------------|---------------|---------------|---------|---------|
| | Prior YR'S | Yr 1 11/12 | Yr 2 12/13 | Yr 3 13/14 | Yr 4 14/15 | Yr 5 15/16 | Yr 7 + | |
| Proposed Capex Investment | 0.140 | 0.335 | 0.005 | | | | | 0.480 |
| Proposed Opex Investment | 0.001 | 0.027 | | | | | | 0.028 |
| Proposed Removal Investment | | 0.072 | | | | | | 0.072 |
| CIAC / Reimbursement | | | | | | | | 0.000 |
| Total | \$0.141 | \$0.434 | \$0.005 | \$0.000 | \$0.000 | \$0.000 | \$0.000 | \$0.580 |

1.14 Resources:

| Resource Sourcing | | | |
|--|--|--|---|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="checkbox"/> Red | <input type="checkbox"/> Amber | <input checked="" type="checkbox"/> Green |
| Availability of external resources to deliver project: | <input type="checkbox"/> Red | <input type="checkbox"/> Amber | <input checked="" type="checkbox"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="checkbox"/> Red | <input type="checkbox"/> Amber | <input checked="" type="checkbox"/> Green |
| Procurement impact on network system: | <input type="checkbox"/> Red | <input type="checkbox"/> Amber | <input checked="" type="checkbox"/> Green |

1.15 Key Issues (include mitigation of Red or Amber Resources):

| | |
|---|---|
| 1 | A detailed outage plan was prepared and construction activities are coordinated with the construction and outage sequence of other projects in this area. |
| 2 | |



US Sanction Paper

1.16 Key Milestones:

| Milestone | Target Date: (Month/Year) |
|-------------------------------|------------------------------|
| Construction Start | June 2011 |
| Project Resanction | December 2011 |
| Construction Complete | May 2012 |
| Submit Facility Rating to ISO | November 2011 |
| Ready for Load - RFL | June 2012 |
| Project Closure Report | November 2012 |

1.17 Climate Change:

| | | |
|--|---|--|
| Are financial incentives (e.g. carbon credits) available? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="checkbox"/> Neutral | <input type="checkbox"/> Positive <input type="checkbox"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="checkbox"/> Neutral | <input type="checkbox"/> Positive <input type="checkbox"/> Negative |

1.18 List References:

| | |
|---|---|
| 1 | 2009 Distribution Annual Plan (2009- 2014) |
| 2 | 2007 The Greater Rhode Island Transmission Planning Study |
| 3 | 2004 "Replacement of Temporary West Farnum Distribution Supply Transformer" – Part 2 of the North Blackstone Valley Area Supply Study. By: John Fritz and Frank Carro |



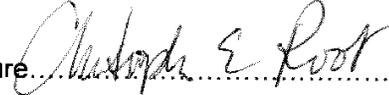
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2 Recommendations:

The **Sanctioning Authority** USSC is invited to:

(a) APPROVE the investment of \$10.630M and a tolerance of +/- 10%

(b) NOTE that **Scott Sobolewski** is the Distribution Line Project Manager and **George Maximovich** is the Substation Project Manager and have the approved financial delegation.

Signature.......... Date..... 1/9/12

Project Sponsor: Christopher E. Root, Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on December 14, 2011

Signature.......... Date..... 1/16/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee



US Sanction Paper

4 Sanction Paper Detail

| | | | |
|---------------------------|---|--------------------------|----------------------|
| Title: | Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders | Sanction Paper #: | USSC0408P31R1 |
| Project #: | C03488, C03693, C24279, C15200 | Sanction Type: | Re-Sanction |
| Operating Company: | The Narragansett Electric Company | Date of Request: | 12/14/11 |
| Author: | Scott Sobolewski / George Maximovich | Sponsor: | Chris Root |
| Utility Service: | Electricity T&D | | |

4.1 Background

The 345/115/13.8 kV transformer at West Farnum substation, North Smithfield, RI failed in November of 2001. A temporary 115/13.8 kV transformer was installed to supply the two distribution feeders at West Farnum. Upon completion of the proposed project the temporary transformer at West Farnum will be removed and transferred back to the system spare transformer pool.

In November of 2006 the power transformer at Riverside substation in the same general area failed. The existing 42 MVA transformer was replaced with a 33 MVA system spare. The reduced capacity has resulted in decreased area reliability during certain area contingencies.

In 2007 Transmission Planning issued a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to accommodate a low profile distribution substation.

In 2007 the Town of Pascoag requested an increase in the capacity to their facility in Burrillville. This will require a second distribution feeder to supply their projected load. The recommended plan involves installation of a new 115/13.8 kV Distribution substation within the existing Woonsocket #26 substation fence. This plan will improve asset replacement, reliability, and load growth conditions.

The originally requested sanction amount of \$9.400M and a tolerance of +/-10% was approved for \$4.400M in June 2009 for DxD projects and \$5.000M in February 2010 for TxT and DxT projects. The project is approximately 79% complete and \$8.390M has been spent to date.

4.2 Drivers

The main drivers for these projects are asset replacement, increased reliability, and load growth.

These projects will provide load relief to Riverside, Nasonville, and Staples Substations. In addition, the new feeders from Woonsocket Substation will permit the removal of all 15kV load from the West Farnum Substation. Once the load is removed from the West Farnum Substation the 15kV temporary transformer and associated equipment can be



US Sanction Paper

taken out of service and removed. The removal of the transformer is necessary for the progression of the RI NEEWS project.

The Town of Pascoag is served by the Nasonville 127W43. The loading on this feeder exceeded 100% in 2010. In order to serve the Town's growing load and address the 127W43 loading an additional feeder is required. Upon completion of the Woonsocket substation and associated feeder, load will be transferred from the Nasonville 127W42 feeder to Woonsocket 26W41 and 26W47 feeders. The reduced loading on the 127W42 feeder will allow this feeder to be built in a westerly direction along the 127W43 for two miles. At this point the Nasonville 127W41 can be transferred to the 127W42 to provide a second feeder to the Town of Pascoag.

This re-sanction is requested for the following reasons:

C03488 – Key Variations

The estimate of \$0.500M was approved in February of 2010 for a 115 kV Tap to provide supply to a new 115/13.8kV substation. The project has spent approximately \$0.480M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- A design change from the original design of wood poles to a new design based on steel poles was executed in order to comply with Substation Engineering Standards due to site location. The design, material and construction variance was \$0.050M.
- A low labor construction estimate on civil and removal activities was estimated which resulted in a variance off \$0.030M

The total project cost variance was \$0.080M.

| Detail Analysis (M's) | Over/Under Expenditure? | Amount |
|---|---|---------------|
| Latest approval | | \$0.500M |
| Key variation 1 – Design change from original design of wood poles to steel poles | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.050M |
| Key variation 2 – Low construction estimate on civil and removal activities | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.030M |

C03693 – Key Variations

The estimate of \$4.500M was approved in February of 2010 to install a 115kV circuit breaker, circuit switcher and 40 MVA transformer as part of a new 115/13.8kV distribution substation. The project has spent approximately \$4.600M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- Removal of foundations and conduits found during site preparation and initial excavations. Available drawings used for detail design and construction estimates indicated that foundations and conduits from previous installation were removed. The total cost variance was \$0.030M.



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- Additional fill and grade was required for stability purposes on foundations close to wetland area based on soil site conditions. The material and construction cost variance was \$0.100M.
- Updated grounding analysis and safety calculations of touch and step voltages determined the need of additional grounding conductor, connectors and ground rods in the 115kV yard. The material and construction cost variance was \$0.120M.
- A low labor construction estimate on civil and primary works was identified. The original construction estimate was based in preliminary engineering documentation. The total cost variance was approximately \$0.350M.

The total project cost variance was \$0.600M.

| Detail Analysis (M's) | Over/Under Expenditure? | Amount |
|---|---|----------|
| Latest approval | | \$4.500M |
| Key variation 1 - Removal of foundations and conduits found during site preparation & excavations - material and labor cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.030M |
| Key variation 2 – Additional fill and grade for stability purpose in foundations – material and labor cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.100M |
| Key variation 3 - Additional grounding conductor, connectors, and ground rods - material and labor cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.120M |
| Key variation 4 – Low Construction Estimate variance | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.350M |

C24279 – Key Variations

The estimate of \$2.900M was approved in June of 2009 to install a 13.8 kV metal-clad switchgear with four feeder positions and a metal enclosed 7.2 MVAR capacitor bank. The project has spent approximately \$2.510M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- Removal of foundations and conduits found during site preparation and initial excavations. Available drawings used for detail design and construction estimates indicated that foundations and conduits from previous installation were removed. The total cost variance was \$0.020M.
- Updated grounding analysis and safety calculations of touch and step voltages determined the need of additional grounding conductor, connectors and ground rods in the 13.8kV yard. The material and construction cost variance was \$0.065M.
- Material cost variance based material market price and storage cost of 13.8 kV metal-clad switchgear for nine months. The total cost variance was \$0.180M
- A low labor construction estimate on civil and primary works was identified. The original construction estimate was based in preliminary engineering documentation. The total cost variance was approximately \$0.035M.

The total project cost variance was \$0.300M.

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| Detail Analysis (M's) | Over/Under Expenditure? | Amount |
|---|---|----------|
| Latest approval | | \$2.900M |
| Key variation 1 - Removal of foundations and conduits found during site preparation & excavations - material and labor cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.020M |
| Key variation 2 – Additional grounding conductor, connectors, and ground rods –material and labor cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.065M |
| Key variation 3 – Material market price and storage cost of 13.8 kV metal-clad switchgear | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.180M |
| Key variation 4 - Low Construction Estimate variance | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.035M |

C15200 – Key Variations

The estimate of \$1.500M was approved in June of 2009 for the distribution portion of this project, C15200. The project has spent approximately \$0.800M to date on engineering, permitting, construction, equipment and materials, and project management. The following key variations resulted in the need for a project re-sanction for C15200:

1) In August of 2011 an updated civil construction estimate was provided for the installation of the new feeder getaway manhole and duct system. The initial civil estimate provided did not include National Grid Labor Adders and repaving of the Woonsocket Substation driveway. The new civil construction estimate increased by \$0.360M.

2) In March of 2011 a Project Change Request was received from Distribution Planning to increase the scope of the project. This PCR was provided to engineering for a detailed design and estimate to include the following:

- Remove 4 existing reclosers and Install 6 new reclosers.
- Install one 1200kVAR cap bank, one 900kVAR cap bank and one 200 kVAR capacitor.
- Change phasing at three separate locations.
- Install three fault indicators.
- Install two load breaks.
- Reconductor 300ft of 1/0 Al cable with 477 kcmil Al cable.
- Perform switching as indicated by Distribution Planning.

The additional work is estimated to cost \$0.340M.

3) In August of 2011 the STORMS design estimate was reviewed by the Project Team for accuracy. It was determined that the estimate included unnecessary labor factors that increased the estimate considerably. These labor factors were corrected in STORMS. The resulting adjustment to the STORMS estimate reduced the construction cost estimate by \$0.450M.



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This paper is requesting an additional \$0.250M to complete the distribution portion of this project. The following table indicates the key variations that account for the difference between the original sanction amount of \$1.500M and the requested re-sanction amount of \$1.750M.

| Detail Analysis (M's) | Over/Under Expenditure? | Amount |
|--|---|---------------|
| Latest approval | | \$1.500M |
| Key Variation 1 – Low construction estimate for civil estimate | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.360M |
| Key variation 2 – A Project Change Request issued by Planning | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.340M |
| Key Variation 3 – Adjustment to STORMS estimate. | <input type="checkbox"/> Over <input checked="" type="checkbox"/> Under | \$0.450M |

4.3 Project Description

4.1 Transmission Project C03488

Install a 115kV transmission tap originating within the existing Woonsocket facility to provide supply to a new 115/13.8kV substation. To facilitate the 115kV tap installation portions of two transmission lines Q143S and V148 will be relocated.

4.2 DxT Project C03693

Install a 115kV circuit breaker, a 115 kV circuit switcher and a 115/13.8 kV [REDACTED] transformer as part of a new 115/13.8kV distribution substation.

4.3 Distribution substation project C24279

The project involves the installation of new foundations, a 13.8 kV metal-clad switchgear with four feeder positions and a metal enclosed 7.2 MVAR capacitor bank. The metal-clad switchgear will supply four 13.8 kV feeders.

4.4 Distribution line project C15200

This project establishes four new distribution feeders at the new Woonsocket #26 substation. The underground work consists of the installation of approximately

- 650 feet of 9-way duct,
- 250 feet of 4-way duct,
- 150 feet of 2-way duct,
- three 4-way manholes,
- +/- 2400 circuit feet of 3-1C 1000 kcmil Cu EPR 15 kV underground cable and miscellaneous underground equipment. (see 5.2.4 for copper justification)

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The overhead work involves the installation of

- 23 poles,
- two 15 kV loadbreak switches,
- four sets of three 600A disconnect switches,
- +/- 3500 circuit feet of 3-477 kcmil Al spacer cable,
- +/- 800 circuit feet of 3-477 kcmil Al bare primary and miscellaneous overhead equipment
- Install 6 new SCADA controlled reclosers

This project will remove

- 23 poles,
- one 15 kV airbreak switch,
- +/- 800 circuit feet of 3-336.4 kcmil Al bare primary,
- +/- 1100 feet of 1-1/0 Al bare primary and miscellaneous overhead equipment.

4.4 Benefits Summary

N/A

4.5 Business Issues

The Woonsocket #26 substation project is in the five year plan. Installation of the proposed substation will increase the area reliability and support the projected load growth. The investment on this project is not tied to any other initiative nor is it applicable to any costs sharing projects.

4.6 Options Analysis

Complete Recommended Option

Connect a new distribution substation at Woonsocket by adding a 115kV circuit breaker in the existing 115 kV yard and create a tap position and construct an overhead tap (See Strategy Paper SG069, approved June 2007). The proposed overhead tap was chosen over underground option as most cost effective and environmentally friendly. In addition, the presence of the stream running through the construction site would make permitting and construction of an alternative underground tap more difficult and expensive. The recommended option is approximately 79% complete and \$8.390M has been spent to date. The cost for the remainder of the projects is approximately \$2.240M for completion and close out of this recommended option.

Alternative 2 – Defer the project

This is a reliability-driven project and delaying the in service date would not allow the Company to support the forecasted load growth and reliability improvement.

Alternative 3 – Do Nothing Option

This is not considered a valid option since it does not meet distribution loading forecast in the area and does not address reliability improvement.

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4.7 Safety, Environmental and Project Planning Issues

This project is constructed within the boundaries of the existing Woonsocket #26 substation. The existing facilities remain energized throughout the construction effort. National Grid safety procedures and best work practices are employed. The substation site is currently secured with a fence and new construction will be done entirely within the existing fence perimeter.

The upgrades at the 115kV yard and the new 115kV transmission tap require transmission line outages. A detailed outage plan was prepared and construction activities are coordinated with the construction and outage sequence of other projects in this area.

Installation of the new distribution substation requires no outages.

RI DEM notification for soil disturbing work, wetlands permitting (Request for Preliminary Determination) and a building permit was required. A request for Preliminary Determination was submitted for review to RI DEM, Wetlands Division and a building permit was submitted for review to the Building Inspector of the Town of North Smithfield, RI. The permitting process is completed.



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4.8 Execution Risk Appraisal

| Number | Status (Active, Dormant, Retired) | Category | Detailed Description of Risk / Opportunity | Cause/Trigger | Probability | Impact | | | Score | | Strategy | Risk Owner | Comments/Actions |
|--------|-----------------------------------|----------------------------------|---|--------------------------------------|-------------|--------|----------|----------|-------|----------|----------|-------------------------|----------------------------|
| | | | | | | Cost | Schedule | Schedule | Cost | Schedule | | | |
| 1 | Active | Construction | Increased man-hours necessary for dewatering site. Site is abutted by Wetlands | Excessive Rainfall | 3 | 1 | 1 | 3 | 3 | 3 | Accept | Construction Supervisor | |
| 2 | Active | Construction | Unforeseen existing underground conditions require changes to the drawings or route of the ductbank | Unforeseen structures encountered | 3 | 1 | 1 | 3 | 3 | 3 | Accept | Construction Supervisor | |
| 3 | Active | Environmental | Contaminated Soils Encountered | Small or discoloration of soil noted | 1 | 2 | 2 | 2 | 2 | 2 | Accept | Construction Supervisor | No AULs linked to property |
| 4 | Active | Outage Planning and Availability | Transmission Line Outage coordination with other projects on this area | Construction execution delays | 2 | 2 | 2 | 4 | 4 | 4 | Mitigate | Construction Supervisor | |



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4.9 Permitting

| Permit Name | Probability Required (Certain/Likely/Unlikely) | Duration | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|---------------------------------------|--|----------|--|---------------------------|
| Freshwater wetlands permit from RIDEM | Certain | 2 Months | Complete | |
| Building Permit | Certain | 1 Month | Complete | |
| | | | | |
| | | | | |

Permitting Summary

- 1) A freshwater wetlands permit from RIDEM pursuant to R.I.G.L. Sec. 2-1-18 et seq. for alteration of freshwater wetlands. The RIDEM issued an Insignificant Alteration Permit for the Project on October 21, 2009 (Permit No. 09-0206) (attached as Attachment E). Please note that this permit also constitutes the authorization from the U.S. Army Corps of Engineers (ACOE) under section 404 of the Clean Water Act for the work proposed. The Project qualifies as a Category 2 activity under the Rhode Island Programmatic General Permit (General Permit No. NAE-2006-2711).
- 2)The Town of North Smithfield Building Department issued an insignificant determination on December 1, 2009 with regard to the Erosion and Sediment Control Permit – Determination of Applicability that was submitted by Vanasse Hangen Brustlin, Inc. on November 3, 2009.

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

The proposed project addresses capacity related reliability concerns in the area. In addition the proposed project supports the company’s regulatory requirements to serve electric wholesale related projected load.

4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$2,126,000. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.



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4.11 Financial Impact to National Grid

4.11.1 Transmission and DxT Cost Summary Table

| Project # | Project Description | Project Estimate Level | \$M | Prior YR Spending | Current Planning Horizon | | | | | | Total |
|--------------------------------|---------------------|------------------------|----------------|-------------------|--------------------------|-----------|-----------|-----------|-----------|---------|---------|
| | | | | | YR1 11/12 | YR2 12/13 | YR3 13/14 | YR4 14/15 | YR5 15/16 | YR6+ | |
| C03488 | Woonsocket #26 | +/- 10% | Capex | 0.140 | 0.335 | 0.005 | | | | | 0.480 |
| | Sub New 115/13.8kV | | Opex | 0.001 | 0.027 | | | | | | 0.028 |
| | | | Removal | 0.000 | 0.072 | | | | | | 0.072 |
| | | | Total | 0.141 | 0.434 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.580 |
| Project # | Description | | | | | | | | | | |
| C03693 | Woonsocket #26 | +/- 10% | Capex | 2.371 | 2.294 | 0.300 | | | | | 4.965 |
| | New 115/13kV Sub | | Opex | 0.009 | 0.041 | 0.005 | | | | | 0.055 |
| | | | Removal | 0.000 | 0.075 | 0.005 | | | | | 0.080 |
| | | | Total | 2.380 | 2.410 | 0.310 | 0.000 | 0.000 | 0.000 | 0.000 | 5.100 |
| Total Proposed Sanction | | | | | | | | | | | |
| | | | Capex | 2.511 | 2.629 | 0.305 | 0.000 | 0.000 | 0.000 | 0.000 | 5.445 |
| | | | Opex | 0.010 | 0.068 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.083 |
| | | | Removal | 0.000 | 0.147 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.152 |
| | | | Total | 2.521 | 2.844 | 0.315 | 0.000 | 0.000 | 0.000 | 0.000 | 5.680 |
| | | | | \$2.521 | \$2.844 | \$0.315 | \$0.000 | \$0.000 | \$0.000 | \$0.000 | \$5.680 |

4.11.2 Project Budget Summary Table

| Project Costs per Business Plan | Prior Year Spending* | YR 1 11/12 | YR 2 12/13 | YR 3 13/14 | YR 4 14/15 | YR 5 15/16 | YR 6+ | Total |
|---------------------------------|----------------------|------------|------------|------------|------------|------------|-------|---------|
| Capex | 2.511 | 3.000 | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 6.011 |
| Opex | 0.010 | 0.084 | 0.009 | 0.000 | 0.000 | 0.000 | 0.000 | 0.103 |
| Removal | 0.000 | 0.224 | 0.024 | 0.000 | 0.000 | 0.000 | 0.000 | 0.248 |
| Total Cost in B Plan | 2.521 | 3.308 | 0.533 | 0.000 | 0.000 | 0.000 | 0.000 | \$6.362 |

* P/Y Actuals

| Variance (Business Plan-Project Estimate) | Prior Year Spending | YR 1 11/12 | YR 2 12/13 | YR 3 13/14 | YR 4 14/15 | YR 5 15/16 | YR 6+ | Total |
|---|---------------------|------------|------------|------------|------------|------------|-------|---------|
| Capex | 0.000 | 0.371 | 0.195 | 0.000 | 0.000 | 0.000 | 0.000 | 0.566 |
| Opex | 0.000 | 0.016 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.020 |
| Removal | 0.000 | 0.077 | 0.019 | 0.000 | 0.000 | 0.000 | 0.000 | 0.096 |
| Total Variance | 0.000 | 0.464 | 0.218 | 0.000 | 0.000 | 0.000 | 0.000 | \$0.682 |



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Distribution Cost Summary Table

| Project # | Project Description | Project Estimate Level | \$M | Current Planning Horizon | | | | | | | Total |
|--------------------------------|---------------------|------------------------|---------|--------------------------|-----------|-----------|-----------|-----------|-----------|---------|---------|
| | | | | Prior YR Spending | YR1 11/12 | YR2 12/13 | YR3 13/14 | YR4 14/15 | YR5 15/16 | YR6+ | |
| C24279 | Woonsocket #26 | +/- 10% | Capex | 1.675 | 1.270 | 0.220 | | | | | 3.165 |
| | New 13.8kV | | Opex | 0.017 | 0.017 | 0.001 | | | | 0.035 | |
| | S/gear | | Removal | 0.000 | 0.000 | 0.000 | | | | 0.000 | |
| | | | Total | 1.692 | 1.287 | 0.221 | 0.000 | 0.000 | 0.000 | 0.000 | 3.200 |
| Project # | Description | | | | | | | | | | |
| C15200 | Woonsocket #26 | +/- 10% | Capex | 0.044 | 1.300 | 0.256 | | | | | 1.600 |
| | Install four 13.8kV | | Opex | 0.000 | 0.050 | 0.015 | | | | 0.065 | |
| | feeders | | Removal | 0.001 | 0.070 | 0.014 | | | | 0.085 | |
| | | | Total | 0.045 | 1.420 | 0.285 | 0.000 | 0.000 | 0.000 | 0.000 | 1.750 |
| Total Proposed Sanction | | | | | | | | | | | |
| | | | Capex | 1.719 | 2.570 | 0.476 | 0.000 | 0.000 | 0.000 | 0.000 | 4.765 |
| | | | Opex | 0.017 | 0.067 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.100 |
| | | | Removal | 0.001 | 0.070 | 0.014 | 0.000 | 0.000 | 0.000 | 0.000 | 0.085 |
| | | | Total | 1.737 | 2.707 | 0.506 | 0.000 | 0.000 | 0.000 | 0.000 | 4.950 |
| | | | | \$1.737 | \$2.707 | \$0.506 | \$0.000 | \$0.000 | \$0.000 | \$0.000 | \$4.950 |

4.11.2 Project Budget Summary Table

| Project Costs per Business Plan | Prior Year Spending* | YR 1 11/12 | YR 2 12/13 | YR 3 13/14 | YR 4 14/15 | YR 5 15/16 | YR 6+ | Total |
|---------------------------------|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|
| Capex | 1.719 | 2.205 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 4.224 |
| Opex | 0.017 | 0.159 | 0.009 | 0.000 | 0.000 | 0.000 | 0.000 | 0.185 |
| Removal | 0.001 | 0.233 | 0.024 | 0.000 | 0.000 | 0.000 | 0.000 | 0.258 |
| Total Cost in B Plan | 1.737 | 2.597 | 0.333 | 0.000 | 0.000 | 0.000 | 0.000 | \$4.667 |

* P/Y Actuals

| Variance (Business Plan-Project Estimate) | Prior Year Spending | YR 1 11/12 | YR 2 12/13 | YR 3 13/14 | YR 4 14/15 | YR 5 15/16 | YR 6+ | Total |
|---|---------------------|----------------|----------------|--------------|--------------|--------------|--------------|------------------|
| Capex | 0.000 | (0.365) | (0.176) | 0.000 | 0.000 | 0.000 | 0.000 | (0.541) |
| Opex | 0.000 | 0.092 | (0.007) | 0.000 | 0.000 | 0.000 | 0.000 | 0.085 |
| Removal | 0.000 | 0.163 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.173 |
| Total Variance | 0.000 | (0.110) | (0.173) | 0.000 | 0.000 | 0.000 | 0.000 | (\$0.283) |

4.11.3 Cost Assumptions

The overall substation, transmission and distribution line projects estimate of \$10.630M is a project grade estimate (-10% to +10%).

Standard material procurement process to be followed, and there are no expected delivery delays.

Standard material and equipment procurement process is to be performed in parallel with Final Design.



US Sanction Paper

4.11.4 Net Present Value / Cost Benefit Analysis

Not financially driven.

4.11.5 Additional Impacts

None

4.12 Statements of Support

4.12.1 Supporters

| Role | Name | Responsibilities |
|-----------------------------------|-------------------|---|
| Investment Planning | Ray Morey | Endorses relative to 5-year business plan or emergent work |
| Project Management | Daniel Glenning | Endorses Cost, Scope, Schedule, and Quality and support of all stakeholders |
| Project Management | Prabhjot Anand | Endorses Cost, Scope, Schedule, and Quality and support of all stakeholders |
| Resource Planning | Mark Phillips | Resource Planning Transmission/Substations |
| Resource Planning | Jim Patterson Jr | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |
| Electric Transmission Planning | Carol Sedewitz | Transmission Planning |
| Transmission Engineering | Mark Browne | Transmission Engineering |
| Transmission Asset Owner | Peter Altenburger | Asset Management Transmission |
| Distribution Asset Owner | Rob Sheridan | Asset Management Distribution |
| Substation Engineering and Design | John Gavin | Substations |
| Protection and Telecommunications | Len Swanson | Protection and Telecommunications |
| Engineering/Design | Bob Brawley | Endorses scope, design, conformance with design standards |
| Construction | Fred Raymond | In-House Construction |
| Transmission Control Center | Will Houston | New England Control Center |



US Sanction Paper

4.12.2 Reviewers

| Reviewer List | Name |
|--------------------------|-------------------|
| Finance | Stephen Nigloschy |
| Regulatory | Peter Zschokke |
| Procurement | Art Curran |
| Jurisdictional Delegates | Jennifer Grimsley |

5 Appendices

5.1 Project Cost Breakdown

| Project Cost Breakdown | | | | | |
|------------------------|---------------|---------------|---------------|---------------|------------------------------|
| Cost Category | <u>I</u> | <u>DxT</u> | <u>D</u> | <u>D</u> | Description of Cost Category |
| | <u>C03488</u> | <u>C03693</u> | <u>C24279</u> | <u>C15200</u> | |
| | <u>\$M</u> | <u>\$M</u> | <u>\$M</u> | <u>\$M</u> | |
| Material | | | | | |
| Labor | | | | | |
| Other | | | | | |
| Transportation | | | | | |
| Reimbursement | | | | | |
| Labor Adders | | | | | |
| Contractor | | | | | |
| AFUDC | | | | | |
| Salvage | | | | | |
| Removal | | | | | |
| O&M | | | | | |
| Retirement | | | | | |
| Total: | 0.580 | 5.100 | 3.200 | 1.750 | |

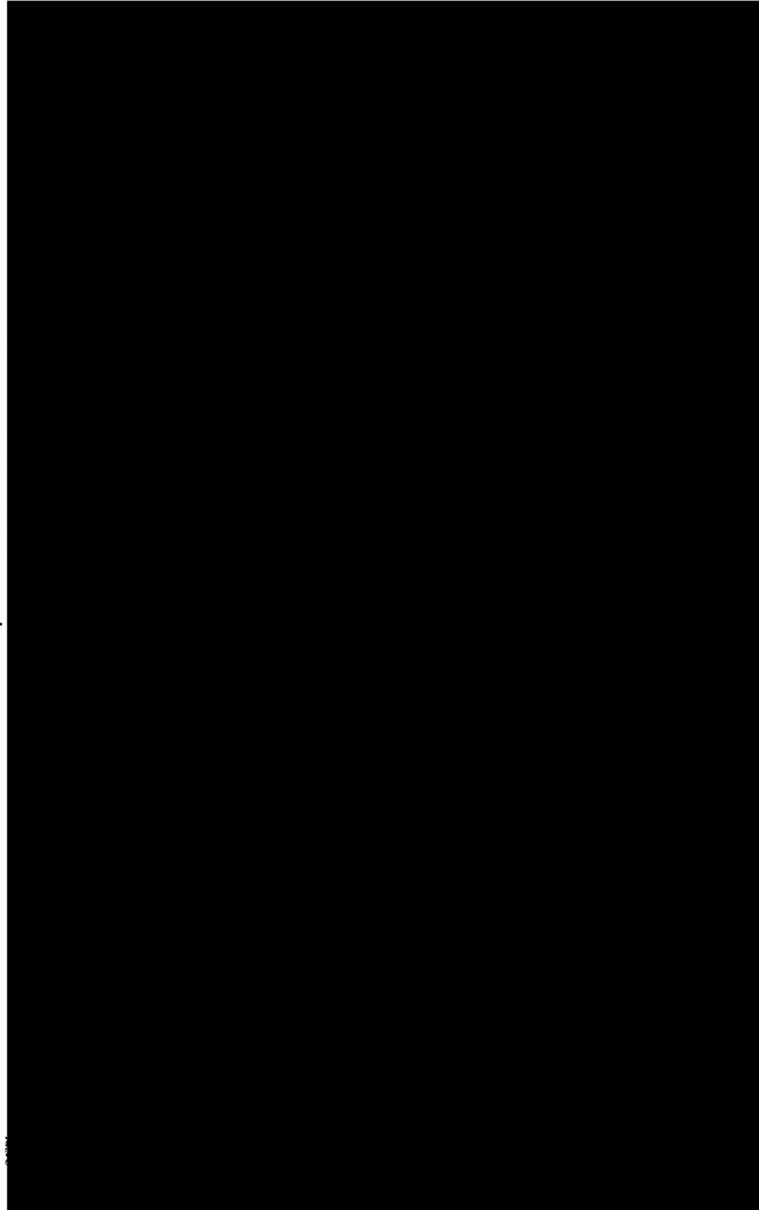
US Sanction Paper



5.2 Other Appendices

5.3 5.2.1 Woonsocket Substation #26 - One Line Diagram

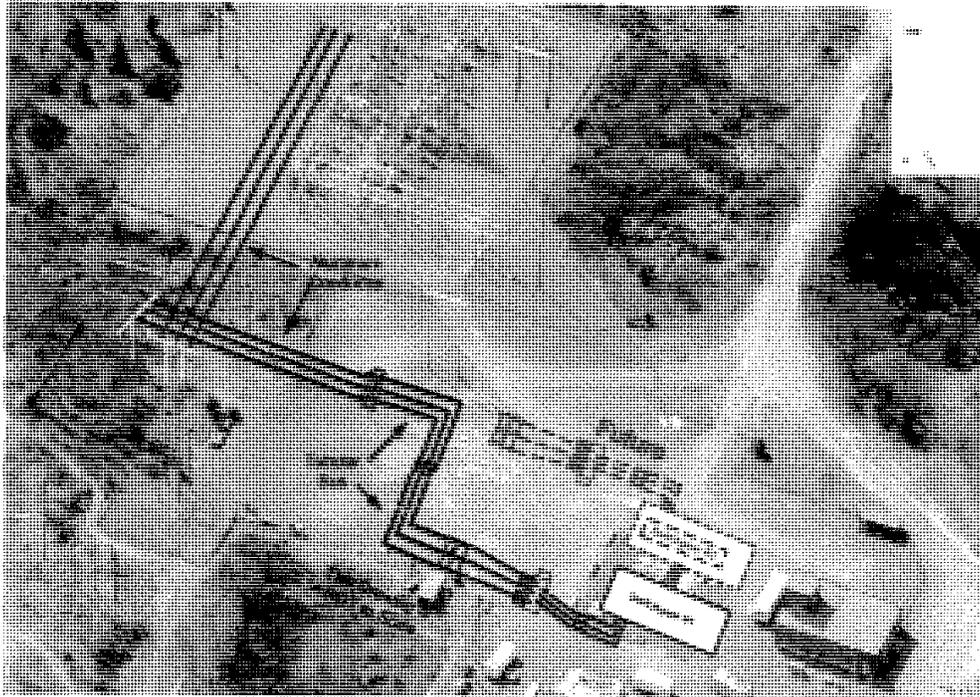
*Woonsocket #26
Proposed One-line for new 115-13.8 kV*



US Sanction Paper



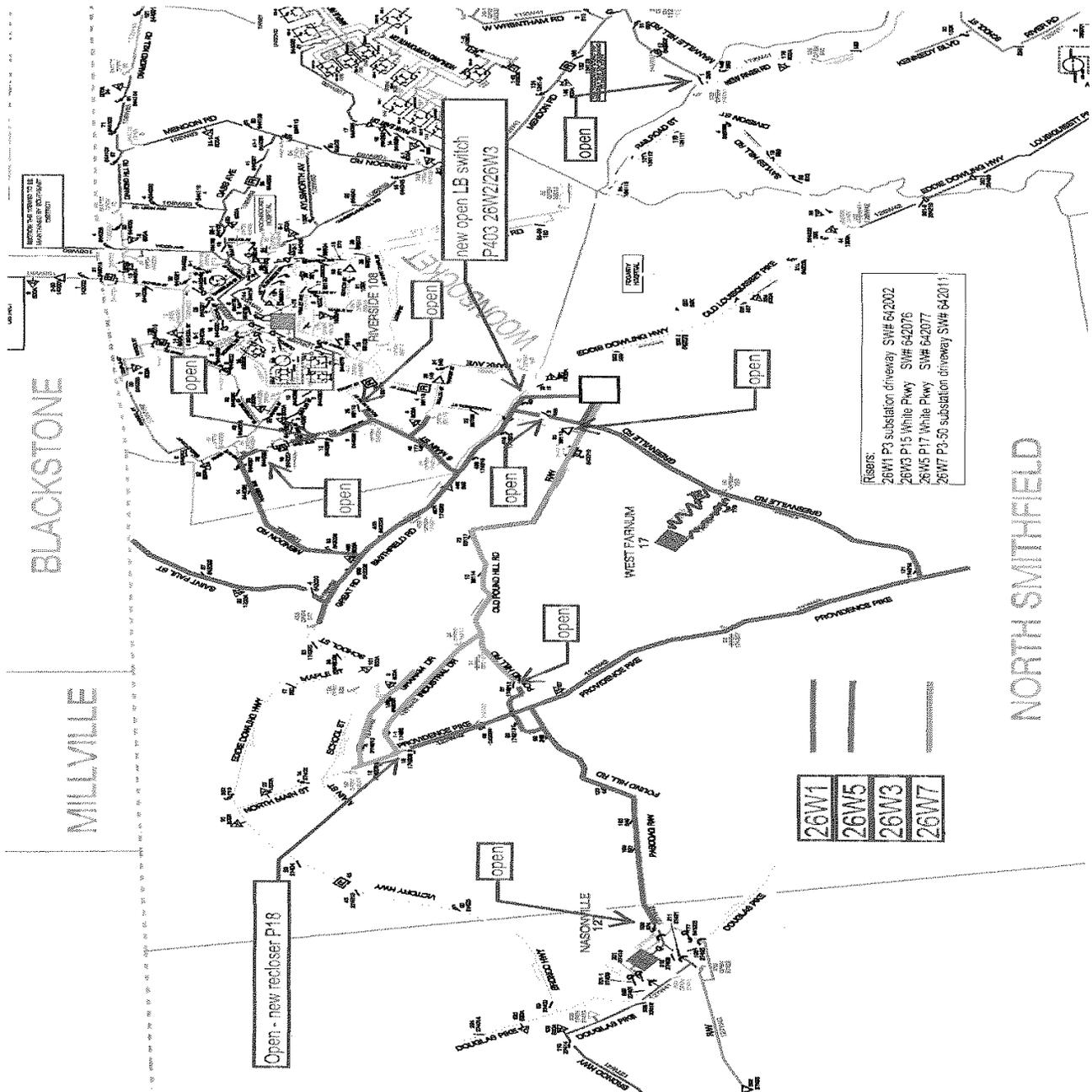
5.2.2 Proposed Layout of 115kV Tap and New Distribution Substation





US Sanction Paper

5.2.3 Woonsocket 26W1, 26W3, 26W5, and 26W7 Feeders





US Sanction Paper

5.4 5.2.4 Project Change Request

Project Change Request

Project Identification

Date: 3/17/11

Project Name: Woonsocket Sub – 4 Dist Fdrs

Project Funding Number: C15200 **Change Number:** _____

Work Order Number: WR#5642331, WR#5612308, WR#5612058, WR#5567170

Project Manager: Scott Sobolewski

5.4.1 Change Request Information

- Category 1 - Configuration Change
- Category 2 - Minor Change
- Category 3 - Major Change
- Category 4 - FY Spend or Target Change

Request Date: 3/17/2011

Requested By: Joel A Rivera **Department:** Distribution Planning

Description of Change:

Changes include distribution line work that is needed to support the feeder arrangements for the new Woonsocket Substation and to facilitate a construction sequence in support of the NEWS project.

Scope Impact: What is being changed, added replaced or deleted?

Remove 4 existing reclosers and Install 6 new reclosers.
 Install one 1200kVAR cap bank, one 900kVAR cap bank and one 200 kVAR capacitor.
 Change phasing at three separate locations.
 Install three fault indicators.
 Install two load breaks.
 Reconductor 300ft of 1/O Al with 477 Al
 Perform switching as indicated by Distribution Planning.

Schedule Impact: What are the schedule impacts?

This scope change will add approximately 1,030 hours to the schedule. This work will be executed once the overhead work for the new feeders is complete. There should be no impact to the ready for load date, as currently we are scheduled to be complete with the new feeder overhead work by September 2011.

Is the ready for load date impacted? No

What is the impact?

If YES; RFL Date changed to _____



US Sanction Paper

Quality Impact: **What is the quality or testing impacts?**
 N/A

Project Change Request Continued

Cost Impact: **What are the estimated costs to the project?**

| Description | Man hours | Cost | Cost Adders or Burdens | Total Cost |
|--|-----------|------|------------------------|------------|
| Engineering Labor | 50 | | | |
| Construction Labor | 870.5 | | | |
| Operations Labor (testing and commissioning) | 100 | | | |
| Material Cost | | | | |
| Consultant or Contractor Cost | | | | |
| Other Cost | | | | |
| Total Cost | | | | |

Impacts Delegation of Authority (DOA)? Yes No

Change Request Cause Codes

- A) Inaccurate existing drawings
- B) Design Error
- C) Material Substitution
- D) Installer preference, install ability/maintain ability issue
- E) Working clearance issue, field interference
- F) Scope Change
- G) Safety Issue
- H) Other (Please Explain) _____

US Sanction Paper



Project Change Request Continued

| <u>Acceptance Information</u> | |
|--------------------------------------|---|
| Accepting Name: | <u>Rob Sheridan</u> |
| Role: | <u>Sponsor</u> |
| Action: Approve: | <input checked="" type="checkbox"/> Reject: <input type="checkbox"/> |
| Accepting Comments: | <u>Indicated that this scope change supported the scope and schedule of the NEWS project.</u> |
| | |
| Accepting Signature: | <u>Robert D. Sheridan</u> |
| Date: | <u>7/28/2011</u> |
| <u>Approver Information</u> | |
| Project Manager Signature: | <u>Scott Sobolewski</u> |
| Date: | _____ |
| Project Sponsor Signature: | _____ |
| Date: | _____ |
| Change Review Committee Signature: | _____ |
| Date: | _____ |

Need to go to Change Review Committee? Yes No

C005414

Farnum Pike Sub_115 kV Dist Assets

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|---------------------------------------|
| Fund Project Number: <u>C005414</u> | USSC #: |
| Revision: <u>8</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Farnum Pike Sub 115 kV Dist Assets</u> | |
| Project Description: 03245 Farnum Pike Sub_115 kV Dist Assets | |

| | |
|---|---|
| Project Status: <u>Closed</u> | |
| Responsible Person: <u>PARENTEAU, STEVE</u> | Initiator: <u>Szymanowski, Slawon</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Dist by Transmission Sub RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>49</u> | Project Complexity Score: <u>15</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|-----------------------|--|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>9/1/2004</u> | | | Est Complete Date: <u>6/30/2009</u> | | |
| Est In-Service Date: <u>12/1/2008</u> | | | | | |
| TTD Actuals: <u>\$3,201,087</u> | | | As Of: <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$3,065,000</u> | <u>\$85,000</u> | <u>\$130,000</u> | <u>\$3,280,000</u> | <u>\$0</u> |

Justification / Risk Identification:
 <Enter data here>

Project Scope:
 <Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|-------------|---------------------------|-----------------|---------------------------|-----------------------------|
| Line 1: | Date | <u>1/10/2007 00:00:00</u> | Approver | <u>poisso</u> | <u>SAP Default Approver</u> |
| Line 2: | Date | <u>1/15/2007 00:00:00</u> | Approver | <u>Sheridan, Robert D</u> | <u>SAP Default Approver</u> |
| Line 3: | Date | <u>1/16/2007 00:00:00</u> | Approver | <u>Root, Christopher</u> | <u>SAP Default Approver</u> |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C005414 Current Total Authorized Amount: \$3,28...

Title

Project Number

Budget Version

Revision

Revision Status

Revision No.

Est Start Date

Est Complete Date

Est In Srvc Date

Capital

Expense

Jobbing

Retirement

Removal

Total (excl. Rets.)

Credits

Net

Revision Info

Revision of 21

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for Critical Energy Infrastructure Information.

NG USA Confidential

December 22, 2004

NATIONAL GRID USA
Northeast Transmission

APPLICATION BY THE NARRAGANSETT ELECTRIC COMPANY (TNECo)
TO INSTALL: TWO 115-13.2 KV , 33/44/55 MVA, 3-PHASE LTC TRANSFORMERS,
TWO CIRCUIT SWITCHERS, NEW CONTROL HOUSE, AND
NEW 115 KV TAP TO T-172N LINE FOR THE FARNUM PIKE # 23 SUBSTATION

Substation Project: ~~E05415~~ *C05414*
Transmission Project: ~~E05415~~ *C05414*

Line
Business Sponsor: Marc F. Mahoney
(Paper by)

Substation Project Engineer: Stanley F. Urbanowski
Transmission Project Engineer: Gerald Pepi (Vanderweil)

Summary

This paper proposes the expenditure of \$3,280,000 to purchase and install two (2) new 33/44/55 MVA, 115-13.2 kV, three-phase LTC transformers , two (2) new 115 kV circuit switchers, new control/switchgear building, new relay/control panels, and associated equipment at the Farnum Pike #23 Substation, Smithfield, RI. The existing transformers, one 115 kV airbreak switch, control building, and control/relay panels will be removed. Expansion of the existing Farnum Pike substation fenced area is required to provide space for installation a new transformer and distribution facilities while maintaining the existing substation to supply the four (4) existing distribution feeders Since the expansion area is restricted due to a gas pipeline that borders the substation on three sides, indoor metal-clad switchgear will be used for the new distribution portion of the substation. The space requirement for the metal-clad switchgear is significantly less than a comparable low profile installation. Several (TNECo) distribution projects are also associated with this sanction paper.

2. A transmission project for a new 115 kV tap line to the T-172N Line is also included in this sanction paper. The vertical drops from the existing tap to the T-172N Line will be disconnected and the existing tap line, dead-end structures, and air break switch will remain for connecting a mobile substation to either the S-171N or the T-172N Line.
3. The proposed substation will provide additional supply needed in order to alleviate load growth and limited capacity of the existing substations in the area. The Smithfield area of Rhode Island has been experiencing the load growth at the rate of 4.5% per annum for last five years. At this load level the distribution system in the area is exposed to contingencies which violate the distribution design criteria.
4. The proposed Transmission and Distribution expenditures are included in the current business plan for FY2005 and FY2006.

5. The in-service date for the new T-172N tap line, new T2 transformer and two new distribution feeders is October 1, 2005. Replacement of the existing T1 transformer and cut-over of the existing four feeders will be completed by June 30, 2006.

Background

6. This project was initiated by Delivery Network Planning (DNP) of the Narragansett Electric Company. The plan to supply the area is detailed in the *Smithfield Area Study 115 kV Supply and Eastern 23 kV Distribution Supply Areas* by John W. Williams issued in May 2004. Working with DNP, Network Planning and Development has reviewed the proposed changes with consideration of future needs of the transmission system in the area. The recommended plan has no adverse impact on the New England Transmission System, is fully supported by the transmission infrastructure, and is consistent with the long term expansion of the transmission system (the analyses is described in the *System Impact Study for the Smithfield Supply Area Modifications* by Slawomir Szymanowski issued in July 2004). A Strategy Paper “Smithfield, RI Area Supply Project” was developed by Slawomir Szymanowski. The paper was presented and noted by Northeast Transmission on June 29, 2004
7. The installation of two new 115kV circuit switchers and retirement of the two existing sacrificial air breaks at the Farnum Pike Substation agrees with Strategic Guideline “NTB SG001” issued by Northeast Transmission to replace all 115 kV sacrificial air break switches. The two existing sacrificial air break switches at the Farnum Pike Substation were listed to be replaced in February 2008.

Project Description

8. Purchase and install two (2) new 33/44/55 MVA, 115-13.2 kV, three-phase LTC transformers, two (2) new 115 kV circuit switchers, new switchgear/control building, new relay/control panels, and associated equipment at the Farnum Pike #23 Substation, Smithfield, RI. Remove two existing transformers, sacrificial air break switches, control house, and other equipment associated with existing station.
9. Install an intermediate 2-pole guyed wood structure into T-172N main line. Install a 2-pole guyed wood tap structure on the main line R/W. Install one short span of conductors to substation and tap existing T-172N line to supply the new T2 transformer. Remove vertical taps between existing main and tap lines T-172N.

Business Issues

10. The new transformers and transmission taps, along with their associated 115 kV switches will improve the area reliability and operability by:
 - Increasing Farnum Pike’s transformer capacity thus offloading the existing transformers in the area, and
 - Limiting construction time by replacing air break switches while building new substation.

11. A new supply source in the Smithfield area is critical to serve load in a reliable manner. Without this additional supply source, the distribution system will be exposed to contingencies that will overload feeders above the limits outlined in the National Grid Distribution Design Criteria as soon as 2005.
12. The proposed improvements are in response to a customer request by The Narragansett Electric Company. At the point of connection, the proposed improvements meet the customer reliability needs and have no adverse impact on the New England Transmission System.

Network Asset Management Review

13. The recommended project meets the requirements as set forth in the *Smithfield Area Study 115 kV Supply and Eastern 23 kV Distribution Supply Areas*, dated May 2004.
14. Transmission Network Assets to be installed at the Farnum Pike Substation include:

Two new 33/44/55 MVA, 115-13.2 kV, 3Ø, LTC Transformers
Two (2) new 115 kV circuit switchers, and
New control/switchgear building
New Relay & Control Panels.
New 115 kV tap to T-172N Line

Safety Appraisal

15. Care will be taken to ensure worker safety by following generally accepted work practices. Specifically, the importance of maintaining appropriate working clearances from, and the performance of a non-reclosing assessment of nearby energized lines will be emphasized in the construction documents issued to Transmission Line Services or contractors.

Environmental and Permitting Issues

16. All substation work is expected to take place adjacent to the existing fence and appears to be well outside of protected buffer zones.
17. The new T-172N Line tap to Farnum Pike Substation will be entirely on the existing right-of-way. No new permits are expected in the course of this project.
18. None of the sites are likely to include any locations where hazardous materials may be found buried in the ground.
19. No environmental issues are expected to be encountered during this project.

Commercial Factors

20. The new facilities at Farnum Pike Substation are 100% Non-PTF.

Narragansett Electric Company

Recovery of Narragansett’s assets are subject to the FERC-approved Integrated Facilities Arrangement (IFA) between Narragansett and NEP. There are two components of the IFA that stem from historical agreements carried forward through mergers of EUA, NEES and National Grid. Recovery differs based upon the assets as follows:

Former NEES/Narragansett Electric Facilities:

Narragansett Electric’s return on and return of capital investment is fixed for facilities that fall under this category. Therefore, there is no incremental recovery for any new capital investment (PTF or Non-PTF).

Currently, Operation and maintenance expenses are recovered monthly based upon actual charges. All other expenses are fixed as part of the Integrated Facilities Agreement. Any increase in those components is currently not recoverable unless we file a revised IFA.

NEP recovers its charges under the Narragansett IFA by passing the costs through the NEPOOL OATT or NEP’s Tariff No. 9, dependent upon whether facilities are PTF or Non-PTF.

Financial Implications

21. Estimated TNECo expenditures are as follows:

TNECO Projects (Requesting Sanction Approval)

| Co.# | Company | Project | Item | Capital | O&M | Removal | Total |
|------|---------|---------|--------------------------------|--------------------|-----------------|------------------|--------------------|
| 49 | TNECo | C05414 | Transmission Substation costs. | \$3,000,000 | \$75,000 | \$125,000 | \$3,200,000 |
| 49 | TNECo | C05414 | Transmission Line costs. | \$65,000 | \$10,000 | \$5,000 | \$80,000 |
| | | | Total | \$3,065,000 | \$85,000 | \$130,000 | \$3,280,000 |

Associated TNECo Distribution projects:

| Co. # | Company | Project | Item | Capital | O&M | Removal | Total |
|-------|---------|---------|-------------------------------|-------------|----------|-----------|-------------|
| 49 | TNECo | C04539 | Distribution Substation costs | \$1,800,000 | \$75,000 | \$125,000 | \$2,000,000 |
| 49 | TNECo | | Distribution Line costs | \$1,200,000 | \$75,000 | \$25,000 | \$1,300,000 |

Estimated Expenditures by year are as follows:

| | FY2005 | FY2006 | FY2007 | Total |
|----------------------|------------------|--------------------|------------------|--------------------|
| TNECo Capital | \$100,000 | \$2,700,000 | \$265,000 | \$3,065,000 |
| TNECo O&M | 0 | \$65,000 | \$20,000 | \$85,000 |
| TNECo Removal | 0 | \$70,000 | \$60,000 | \$130,000 |
| Total | \$100,000 | \$2,835,000 | \$345,000 | \$3,280,000 |

Estimated Expenditure Breakdown by year are as follows:

| Item | FY2005 | FY2006 | FY2007 | Estimated Transmission Costs |
|----------------|------------------|--------------------|------------------|-------------------------------------|
| Material | 0 | \$1,635,000 | \$200,000 | \$1,835,000 |
| Labor | \$55,000 | \$470,000 | \$35,000 | \$560,000 |
| Other | 0 | \$200,000 | 0 | \$200,000 |
| Transportation | 0 | \$35,000 | \$15,000 | \$50,000 |
| Reimbursement | 0 | 0 | 0 | 0 |
| Labor Adders | \$45,000 | \$400,000 | \$30,000 | \$475,000 |
| Contractors | 0 | \$40,000 | 0 | \$40,000 |
| AFUDC | 0 | \$40,000 | \$80,000 | \$120,000 |
| | 0 | 0 | 0 | 0 |
| Total | \$100,000 | \$2,820,000 | \$360,000 | \$3,280,000 |

- 22. The estimated project cost is \$3,280,000 with an allowable variance of +/-5%.
- 23. Proposed expenditures are included in current business plan for FY2005 and FY2006.
- 24. There may be congestion costs associated with taking the T-172N line out of service to install the new tap to the Farnum Pike substation and taking the S-171N line out of service to replace the existing transformer and air break switch. All efforts will be made to schedule the S-171N and T-172N line work to minimize the likelihood of congestion costs.

Project Risk Appraisal

- 25. The ability to obtain the necessary permits and scheduled line outages could delay project completion.
- 26. During construction, every effort will be made to reduce the risk of unplanned customer outages through coordination with Systems Operation and the Ocean State Division.

Other Approvals and Conditions

27. NEPOOL Section 18.4 approval is required for this project.

Statements of Support

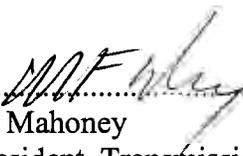
28. The following functions support this proposal

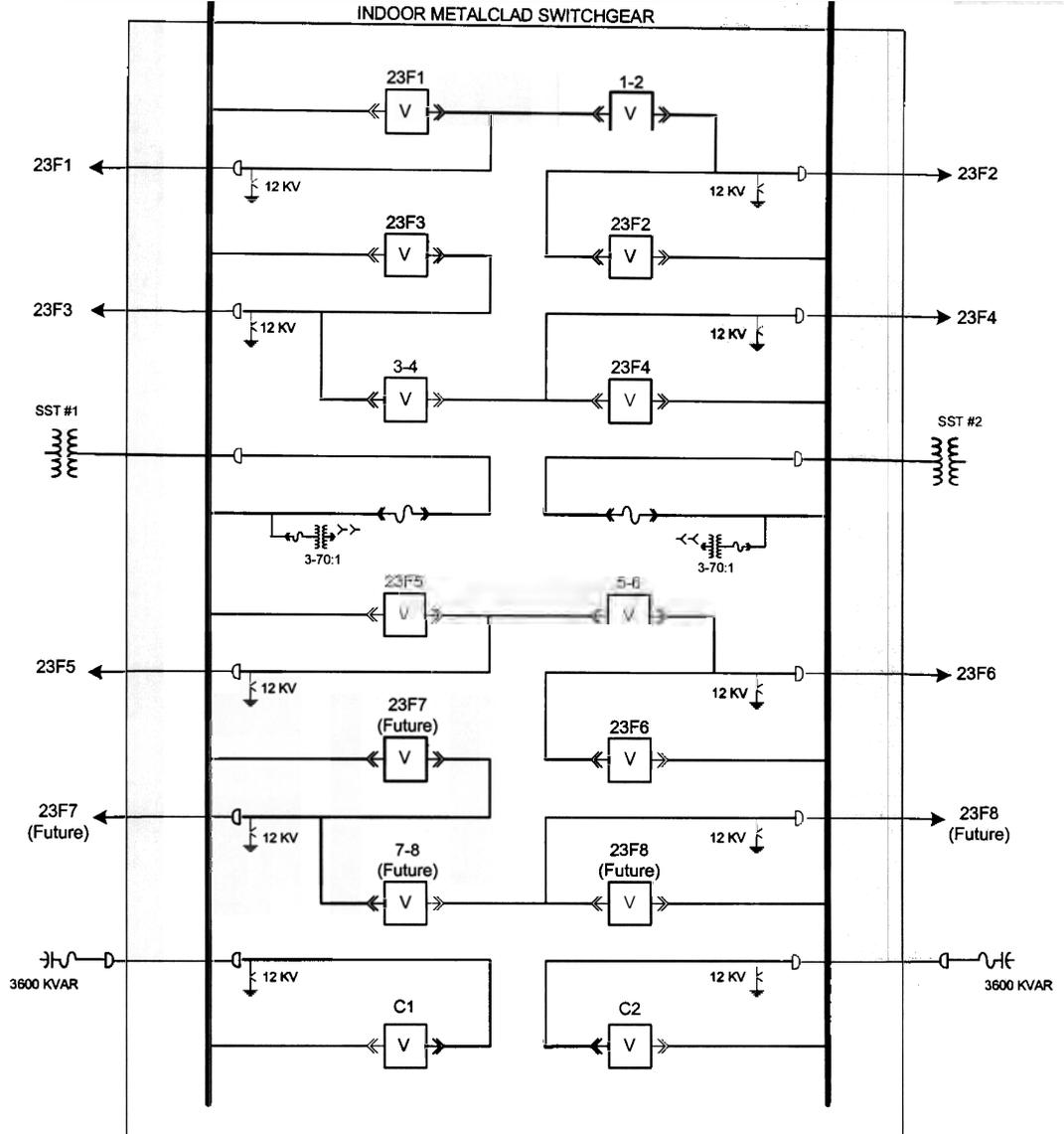
- Transmission Asset Strategy
- Transmission Commercial Services
- Transmission Finance
- Network Planning and Development
- System Planning and Engineering
- Substation Engineering Services
- VP and Chief Engineer
- Protection, Telecommunications & Meter Engineering
- Ocean State Division Operations

Recommendation

29. National Grid USA Management is invited to approve a total New England Power Company expenditure of \$3,280,000 for the purposes stated above.

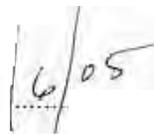
Sponsors' Signature

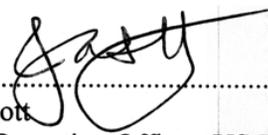
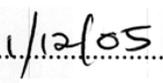
Signed..........Date.....1/9/05.....
 Marc F. Mahoney
 Vice President, Transmission Network Asset Management



Decision of the Sanctioning Authority

30. Signing below will indicate approval of this recommendation

Signed..........Date.....
Edward J. Dienst
Sr. Vice President, New England Operations

Signed..........Date.....
Jeff Scott
Chief Operating Officer, US Transmission Business

Initial



In addition, the approver also delegates authority to enter into subsequent commitments with external parties as necessary to carry out the project. This additional authority is granted at the discretion of the approver by initialing in the box. Total dollars committed is limited to \$3,444,000 which consists of the project estimated cost plus accuracy threshold and is included in the sanction paper.

C015158

Newport Substation (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|---------------------------------------|
| Fund Project Number: <u>C015158</u> | USSC #: <u>USSC-14-262 v2</u> |
| Revision: <u>7</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Newport Substation (D-Sub)</u> | |
| Project Description: Construct Newport Substation. This project is for the metal-clad switchgear and cap banks. | |

| | |
|---|--|
| Project Status: <u>open</u> | |
| Responsible Person: <u>FIKU, ENDRIT</u> | Initiator: <u>Reis, Nicholas</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Sub RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>41</u> | Project Complexity Score: <u>33</u> |

| | | | | | |
|---|-----------------------|-----------------------|-----------------------|--|-----------------------|
| <u>Project Schedule / Expenditures</u> | | | | | |
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>4/1/2007</u> | | | | Est Complete Date: <u>9/30/2023</u> | |
| Est In-Service Date: <u>9/30/2022</u> | | | | | |
| TTD Actuals: <u>\$1,692,339</u> | | | | As Of: <u>10/2/2017</u> | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$1,000,000</u> | <u>\$0</u> | <u>\$0</u> | <u>\$1,000,000</u> | <u>\$0</u> |

Justification / Risk Identification:
 Refer to attached documents for project justification and risk identification.

Project Scope:
 Build a new 69/13.8kV substation in Newport consisting of 2-40MVA LTC transformers supplying metal-clad switchgear each with 4-feeders and a 2-stage 7.2MVAR capacitor bank. This project is for the metal-clad switchgear and cap banks.

Refer to attached Conceptual Engineering Report for scope of this work.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Several Projects see DOA Allocation attached below

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>3/4/2016 13:18:55</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C015158 Current Total Authorized Amount: \$1,000,000

Title **Newport Substation (D-Sub)**

Project Number **C015158**

| | |
|----------------------------|-----------------------|
| Budget Version | Default (active) |
| Revision | v2 |
| Revision Status | Approved |
| Revision No. | 7 |
| Est Start Date | 04/01/2007 |
| Est Complete Date | 09/30/2023 |
| Est In Srvc Date | 09/30/2022 |
| Capital | \$1,000,000.00 |
| Expense | \$0.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$0.00 |
| Total (excl. Rets.) | \$1,000,000.00 |
| Credits | \$0.00 |
| Net | \$1,000,000.00 |

Revision Info **Other Updates**

Revision of 7

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for Critical Energy Infrastructure Information (CEII).



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|--|
| Title: | Aquidneck Island | Sanction Paper #: | USSC-14-262 V2 |
| Project #: | C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 02/10/16 |
| Author: | Ayo Osimboni | Sponsor: | John Gavin Vice President Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Ayo Osimboni |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction in the amount of \$13.937M with a tolerance of ±10% for full implementation of work on Gate 2 Feeder 38W2 and conversion of feeder 122J6, which are part of the distribution work associated with funding # C028628 also work associated with funding # CD00649, Gate 2 Substation D-Sub all of which are part of the Aquidneck Island Reliability Project. This sanction amount will provide funding for the construction activities.

The sanction amount of \$13.937M is broken down into:

- \$ 12.623M Capex
- \$ 0.423M Opex
- \$ 0.891M Removal

NOTE the potential investment of \$55.827M and a tolerance of -25% +50% contingent upon submittal and approval of a Project Sanction paper following completion of all engineering activities.

1.2 Project Summary

Build a 69/13.8kV feeder at Gate 2 substation in the City of Newport to provide short-term relief to the City prior to the construction of the new Newport substation and also begin the upgrade of the distribution lines, Gate 2 Feeder 38W2 and Conversion of Feeder 122J6 which are part of the overall distribution line upgrade for the Aquidneck Island Reliability project.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---------------------------|-----------------------|
| C028628 | D-Line | Newport SubTran & Dist | 17.024 |
| CD00649 | D-Sub | Gate 2 Substation | 1.890 |
| C024159 | D-Line | Newport 69kV line 63 | 1.411 |
| C054054 | D-Line | Jepson Sub | 6.631 |
| C015158 | D-Sub | Newport Sub | 10.557 |
| C054052 | D-Sub | N. Aquidneck Retirement | 0.332 |
| C058310 | D-Sub | Harrison Sub Improvement | 0.326 |
| C058401 | D-Sub | Merton Sub Improvements | 0.387 |
| C058404 | D-Sub | Kingston Sub Improvements | 0.595 |
| C058407 | D-Sub | S. Aquidneck Retirements | 0.342 |
| CD00651 | D-Sub | Bailey Brook Retirement | 0.463 |
| CD00652 | D-Sub | Vernon Retirement | 0.302 |
| CD00656 | D-Sub | Jepson Substation | 15.567 |
| Total | | | 55.827 |

1.4 Associated Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|--------------------------------|-----------------------|
| C041183 | T-Sub | Jepson 115kV Station (T-Sub) | \$13.20 |
| C041184 | T-Line | Line 61/62 Conversion (T-Line) | \$22.70 |
| C041185 | T-Sub | Dexter 115kV Station (T-Sub) | \$3.90 |
| Total | | | \$39.80 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Tolerance |
|------------|-----------------|-------------------|------------------------------|---------------------------------|------------------|-----------|
| 12/10/2014 | USSC | \$10.000M | \$53.585M | Aquidneck Island | Partial Sanction | +/-25% |
| 11/09/2011 | USSC | \$15.000M | \$42.00M | Aquidneck Island | Partial | -25% +50% |
| 12/03/2008 | DCIG | \$15.500M | \$15.50M | Substation Installation Project | Sanction | +/- 25% |
| 04/02/2008 | DCIG | \$3.500M | \$12.30M | Newport Substation Installation | Strategy | +/- 25% |
| 10/11/2005 | Power Plant | \$1.000M | N.A. | Newport Land Purchase | Strategy | N.A. |



US Sanction Paper

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|---|
| June 2017 | Project Sanction (Distribution Line Work) |

1.7 Category

| Category | Reference to Mandate, Policy, NPV, or Other |
|---|--|
| <input type="radio"/> Mandatory | National Grid USA Internal Strategy Document Distribution Planning Criteria Strategy Issue 1 – February 2011 |
| <input checked="" type="radio"/> Policy- Driven | |
| <input type="radio"/> Justified NPV | |
| <input type="radio"/> Other | |

1.8 Asset Management Risk Score

Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 33

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--|---|--|--|
| FY17-2021 New England Distribution Electric capital Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | 9.774M |

1.12 If cost > approved Business Plan how will this be funded?

Inclusion of dollars in future plans and approval by Rhode Island PUC through the annual ISR Approval process will be required.

1.13 Current Planning Horizon

| \$M | Prior Yrs | Current Planning Horizon | | | | | | Total |
|--------------------|--------------|--------------------------|--------------|---------------|---------------|--------------|--------------|---------------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | |
| CapEx | 3.971 | 3.676 | 5.247 | 15.705 | 11.978 | 5.523 | 0.000 | 46.100 |
| OpEx | 0.063 | 0.277 | 0.381 | 1.161 | 1.911 | 0.524 | 0.000 | 4.317 |
| Removal | 0.060 | 0.583 | 0.774 | 1.819 | 1.650 | 0.524 | 0.000 | 5.410 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 4.094 | 4.536 | 6.402 | 18.685 | 15.539 | 6.571 | 0.000 | 55.827 |

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Partial Sanction for Dline Project | February 2016 |
| Construction Complete - Gate 2 Feeder | March 2016 |
| Ready for Load - Gate 2 Feeder | June 2016 |
| EFSB Decision - 115kV Reinforcements | March 2017 |
| Engineering Design Complete 4kV Station Upgrades | June 2017 |
| Construction Start – 4kV Station Upgrades | June 2017 |
| Engineering Design Complete Newport Substation | March 2018 |



US Sanction Paper

| Milestone | Target Date: (Month/Year) |
|---|---------------------------|
| Construction Start - Newport Substation | April 2018 |
| Engineering Design Complete Jepson Substation | August 2018 |
| Construction Start – Jepson Substation | September 2018 |
| Construction Complete - Newport Substation | September. 2019 |
| Construction Start – 4kV Station Retirements | December 2019 |
| Ready for Load - Newport Substation | December 2019 |
| Construction Complete – 4kV Station Upgrades | March 2020 |
| Construction Complete – Jepson Substation | March 2020 |
| Ready for Load - Jepson Substation | November 2020 |
| Engineering Design Complete Station Retirements | September 2022 |
| Project Closure Report | September 2023 |

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|--|
| 1 | State and local permits are required to build Newport substation and the distribution line work. |
| 2 | The ER report was filled with the Energy Facility Siting Board (EFSB) on |



US Sanction Paper

| | |
|---|--|
| | December 30 th 2015 for the proposed Jepson substation and 61/62 line upgrade. |
| 3 | Navy approval to build the 13.8kV feeder at Gate 2 substation has been received but we still need their approval to build the 69kV tap to proposed Newport substation. |
| 4 | A major public outreach effort is ongoing for communities impacted by the substation construction and distribution line construction and conversion work. |
| 5 | Coordination with RIDOT is ongoing to review compliance with the Americans with Disabilities Act (ADA) for new pole sets or pole replacements. |
| 6 | A traffic mitigation plan is needed for the distribution line construction and the proposed conversion work. |

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |

1.18 List References

| | |
|---|---|
| 1 | Distribution Planning Criteria Strategy, Issue 1, February 2011 |
| 2 | Conceptual Engineering Report, Newport Mall Substation, 7/20/11 |
| 3 | Conceptual Engineering Report, Gate 2 Substation, 7/21/11 |
| 4 | Conceptual Engineering Report, Jepson Substation, 7/22/11 |
| 5 | Conceptual Engineering Report, Bailey Brook Substation, 7/25/11 |
| 6 | Conceptual Engineering Report, Vernon Substation, 7/25/11 |
| 7 | Newport Area Supply and Distribution Study, May 2007 |
| 8 | Jepson Equipment Condition Assessment, February 2005 |



US Sanction Paper

2 Decisions

The Senior Executive Sanctioning Committee Committee (SESC) at a meeting held on 02/22/16:

(a) APPROVED the investment of \$13.937M and a tolerance of +/- 10% for construction activities associated with building the 69/13.8kV feeder at Gate 2 substation and begin the distribution upgrade of Gate 2 feeder 38W2 and 122J6 which are all part of Aquidneck Island Reliability Project.

(b) NOTED the potential distribution investment \$55.827M to and a tolerance of -25% +50%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Ayo Osimboni has the approved financial delegation to undertake the activities stated in (a).

Signature Margaret M Smyth Date 3/1/16
 Margaret Smyth
 US Chief Financial Officer
 Chair, Senior Executive Sanctioning Committee

US Sanction Paper



3 Sanction Paper Detail

| | | | |
|---------------------------|---|--------------------------|---|
| Title: | Aquidneck Island | Sanction Paper #: | USSC-14-262 V2 |
| Project #: | C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 02/10/16 |
| Author: | Ayo Osimboni | Sponsor: | John Gauvin Vice President Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Ayo Osimboni |

3.1 Background

The Newport Study Area encompasses the City of Newport and the towns of Portsmouth, Middletown, Jamestown and Prudence Island. Figure 1 shows a geographic map of the study area. The area has approximately 34,000 customers with a peak load of 146MW. Aquidneck Island has most of the load and peaks at 135MW, Jamestown peaks at 10MW and Prudence Island at 1MW.

The area is supplied by two (2) 115kV lines (L14 & M13) which terminate on the northern half of Aquidneck Island at Dexter substation. From Dexter substation, two (2) 69 kV lines (Lines 61 & 62) continue south to supply Jepson substation. From Jepson substation, a single 69kV line (Line 63) continues south to supply the US Naval Base (Navy 1 substation) and Gate 2 Substation. Figure 2 shows a one-line of the existing transmission system.

A single 115/13.8kV transformer at Dexter supplies the distribution load on the northern section of Aquidneck Island and a single 69/13.8kV transformer at Jepson supplies the middle section of the Island. The remainder of the load is supplied by five (5) 23kV lines sourced from Jepson and Gate 2 substations which supply a 4.16kV distribution system with approximately 70MW of load. Twelve 23/4.16kV substations, ten located in the southern half of Aquidneck Island and two in Jamestown, supply this 4.16kV system. Figure 3 shows a one-line of the existing sub-transmission system and Figure 4 shows the approximate geographic areas supplied by the distribution system.



US Sanction Paper

Interruptions to the Newport electrical system resulting in significant customer outages occurred in the summer of 2003. One of the action items proposed by the Company to the Rhode Island Public Utility Commission (RI PUC) was to conduct a planning study to identify and resolve electrical related issues in the area.

This area study was published in May 2007 and titled "The Newport Area Supply and Distribution Study". The Study identified an immediate need to build a new substation in the City of Newport to address both normal and contingency overloads. The study recommended construction of a new substation consisting of a single transformer supplying four (4) 13.8kV feeders. The new station was to be sourced from Line 63, a radial 69kV supply line that supplies the US Navy and Gate 2 substations.

Construction of a new substation was contingent on the company acquiring a parcel of land in Newport for this substation. The Company encountered significant challenges in acquiring a suitable land parcel which has impacted the in-service date of this substation. To address critical loading concerns in the City of Newport, the 2008 Annual Plan recommended accelerating some of the distribution construction identified in the 2007 study and recommended redistributing the area load on the supply and distribution systems to optimize all available capacity. All recommended investments are complete.

In 2011, the Company purchased a parcel of land in the City of Newport suitable for a new substation. The company successfully worked with the city to amend the zoning ordinance to allow a substation to be built via a special permit. The substation site was encumbered by a lease that was released by the tenant in 2014. The substation construction is projected to start in the spring 2018 with an in-service date of fall 2019.

Transmission Planning has recently completed a review of the Aquidneck Island transmission supply system. This review identified various n-1 thermal overloads and voltage issues throughout Aquidneck Island. The review identified a need to upgrade the 69kV lines from Dexter to Jepson substation to 115kV and the need to rebuild Jepson substation as an 115kV station. The review also identified various asset condition, safety, and environmental concerns with Jepson substation.

Jepson substation consists of a 69kV station, a 23kV station, a 13.8kV station, and a 4.16kV station. The station is located within the 100 year floodplain and directly adjacent to Sisson Pond and entirely within Zone A Watershed Protection Overlay. The station will be rebuilt on company owned land in Middletown and outside the 100 year floodplain and the Zone A Watershed Protection Overlay. The existing station will be retired and all equipment removed.

The new 115kV station in Middletown will be part of a transmission sanction paper along with the upgrades of the 69kV lines to 115kV and modifications to Dexter substation. The new 115/23kV station and the new 115/13.8kV station is part of the sanction for the Distribution Line Project. The existing 23/4.16kV station will be retired and load converted to the 13.8kV system. This is the most economical approach as opposed to building a new 23/4.16kV station in Middletown.



US Sanction Paper

3.2 Drivers

The primary driver of this project is reliability. Aquidneck Island is supplied by a highly utilized supply and distribution system. It is increasingly challenging to supply load in southern Middletown and in the City of Newport. The Jepson 13.8kV system has been utilized to provide relief to the 23kV supply system and the 4.16kV distribution system. However, this 13.8kV system has been extended to its limits.

The 23kV supply system is a mixture of overhead and underground construction in Middletown and predominantly underground construction in Newport. The underground system consists mostly of paper and lead cable installed in 3-inch ducts. The 3-inch ducts are not suitable to house required solid dielectric cables, making upgrades to the 23kV supply system challenging and costly.

For loss of the Dexter 115/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 540MWh.

For loss of the Jepson 69/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 550MWh.

For loss of the 69kV line section between Jepson and the Navy substation on peak approximately 21MW of load on Aquidneck Island would remain un-served resulting in an estimated exposure of 500MWh.

A number of 23/4.16kV stations in the area have asset condition, safety, environmental, and thermal concerns which need to be addressed. The recommendation is to retire these stations. This recommendation is part of a comprehensive solution developed for Aquidneck Island to address all concerns at least cost.

In the summer of 2003, interruptions to the electrical system in Newport resulted in significant customer outages. One of the action items proposed by the Company to the Rhode Island Public Utility Commission was to conduct a planning study to identify and resolve electrical related issues in the area.

3.3 Project Description

Install a 69/13.8kV feeder at Gate 2 substation in the City of Newport with a recommended in-service date of March 2016. This feeder addresses near-term thermal concerns in Newport until a new substation is built to provide the required long-term relief. All the work associated with this feeder is in-line with the long-term plan for the area resulting in no out of line expenditures.

Build a new 69/13.8kV substation in Newport on a parcel of land recently purchased for this purpose. The substation will consist of a single transformer supplying four (4) 13.8kV feeders. A short 69kV tap is required to supply this station. A one-line of the proposed station is shown on Figure 5.

Build a new substation in Middletown (Jepson Substation) on company owned land. The substation will consist of two (2) 115/13.8kV transformers supplying six (6) feeders and



US Sanction Paper

two (2) 115/23kV transformers supplying three (3) supply lines. A new 115kV station will also be built on this site to replace the existing Jepson 69kV substation. This 115kV station will be sanctioned separately as part of transmission reinforcements required on Aquidneck Island. A one-line of the proposed 115/23kV station is shown on Figure 6. A one-line of the proposed 115/13.8kV station is shown on Figure 7.

The 23kV supply system on Aquidneck Island needs relief. The most economical approach is to retire a number of 23/4.16kV stations and to convert the load to the 13.8kV system. This approach addresses asset condition, safety, environmental, thermal, and reliability concerns with these assets at least cost. This approach is part of a comprehensive solution that eliminates the need to install a new 69kV line to Newport (a \$32M investment). This approach retires four 23/4.16kV stations which include:

- Vernon substation is a metal-clad station built in 1949. It has two transformers, TR231 installed in 1949 and TR232 installed in 1963. The metal-clad switchgear is obsolete and needs to be replaced to address safety & reliability concerns. Station breakers are obsolete and the TR231 needs to be replaced due to poor condition. The estimated cost to rebuild this station is \$4.90M. The retirement of this station eliminates this \$4.9M investment.
- Bailey Brook was built in 1941 on a small site with no room for expansion. It is located within local wetlands and adjacent to a brook that is the source of island water supply. Rebuilding the station outside the floodplain is not an economical approach because station is located in downtown Middletown and in a congested area. Locating and permitting a new site is not practical or economical. There is no economic or reliability benefit to keeping this station.
- South Aquidneck is a metal-clad station located within the flood plain. It has a single LTC transformer supplying 3-feeders. The station breakers are obsolete along with the station insulators and arresters. The estimated cost to address these concerns is \$0.80M. However, this station cannot be offloaded due to lack of feeder ties and because the site is too small to install a mobile transformer. The LTC is an arcing in oil design which requires a higher level of maintenance.
- North Aquidneck is a metal-clad station with a single transformer supplying 3-feeders. The station has non-standard breakers and limited EMS. The LTC is an arcing in oil design which requires a higher level of maintenance. Station has similar offloading challenges to South Aquidneck making station maintenance very challenging.

The retirement of these 4.16kV station increases the reliability on the 13.8kV distribution system with increased feeder ties. The conversion of the 4.16kV load to 13.8kV also reduces line losses by approximately 90%. A one-line of the proposed station retirements is shown on Figure 8.



US Sanction Paper

3.4 Benefits Summary

The recommended plan is in-line with commitments made by the Company to state regulators. The plan is part of a comprehensive solution for Aquidneck Island and addresses all asset condition, safety, environmental, thermal, and reliability concerns at the least cost.

Plan introduces new 13.8kV capacity in the heart of the existing Newport 4.16kV system sourced from the 69kV supply system. No load will be left un-served for loss of a transformer or supply line resulting in a very reliable supply to the City of Newport and southern Middletown.

Plan provides capacity to supply load growth on Aquidneck Island well beyond the study horizon period at relatively low cost. Spare capacity will exist at Dexter, Jepson and Newport substations to supply future load growth.

Plan eliminates substation equipment in need of replacement or upgrades; eliminates the need to upgrade manhole and ductline infrastructure to reinforce the 23kV supply system; and eliminates the need for a second 69kV line into Newport.

3.5 Business and Customer Issues

The project follows up on action items proposed by the Company to the Rhode Island Public Utility Commission to identify and resolve electrical related issues in the area as a result of interruptions to the Newport electrical system resulting in significant customer outages that occurred in the summer of 2003. Failure to execute this project may impact commitment made by the Company to state regulators.

3.6 Alternatives

Alternative 1: New 69kV Line to Newport and substation additions (\$82.85M)

Construct a new 69kV underground transmission line from the new 115kV substation in Middletown to the new substation in Newport. A comprehensive routing analysis was completed for this supply line and this analysis concluded the line would have to be built underground on city streets.

Construct a new 115/13.8kV and a new 115/23kV substation in Middletown (Jepson Substation) on the site of the proposed 115kV station. The 115/13.8kV station would consist of a single transformer supplying metal-clad switchgear with (4) 13.8kV feeder positions. The 115/23kV station would consist of two (2) transformers supplying metal-clad switchgear with (3) 23kV supply lines.

Construct a new 69/13.8kV substation in Newport on a parcel of land recently acquired for this purpose. The station would consist of two (2) transformers supplying metal-clad switchgear with (8) 13.8kV feeder positions with five feeders being initially installed.



US Sanction Paper

The 115/23kV station would consist of two (2) transformers supplying metal-clad switchgear with (3) 23kV supply lines.

This alternative would retire North Aquidneck, South Aquidneck, Bailey Brook, and Vernon substations to relieve the highly loaded 23kV supply system and is part of a comprehensive solution to address asset condition, environmental, thermal, and reliability concerns at least cost. Upgrading the 23kV supply system is not an economical approach since most of the infrastructure consists of small paper and lead cable installed in 3-inch ductline. The small ductline is not suitable to house the required larger solid dielectric cables. Upgrading this infrastructure is not recommended due to the significant cost impact.

The estimated cost of this plan is \$82.85M, or \$29.00M higher than the preferred plan. This plan has similar reliability benefits to the preferred plan. However, there is no economic or reliability benefit to implement this plan over the preferred plan.

Alternative 2: Non-Wires Alternative

The recommended plan is part of a comprehensive solution to address asset condition, safety, reliability, and environmental concerns on Aquidneck Island. The need for these investments is immediate. Due to the immediate need for these investment and because many concerns are related to asset condition and environmental issues, a non-wires solution is not applicable. New supply and distribution capacity is the only reasonable alternative to address the identified concerns.

3.7 Safety, Environmental and Project Planning Issues

A filing to the Rhode Island Energy Facility Siting Board (“EFSB”) is required to build the proposed new 115kV substation in Middletown and to upgrade the 69kV lines (Line 61 and Line 62) to 115kV. The ER report was filed on December 23rd 2015 with the board.

An Environmental Report is required to support the application to the EFSB for construction of jurisdictional facilities. The Environmental Report was prepared in accordance with the EFSB Rules to provide information on the potential environmental impacts of the electric transmission system improvements proposed by National Grid.

Voltage conversions are required to upgrade the distribution system from 4.16kV to 13.8kV in Newport and Middletown. Outages are required to energize the converted areas at 13.8kV. These conversions and outages may have to occur during off hours or winter months to avoid conflicts with the City of Newport’s tourist season.



US Sanction Paper

3.8 Execution Risk Appraisal

| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Risk Owner | Comments/Actions |
|--------|---|-------------|--------|----------|-------|----------|----------|--|---|
| | | | Cost | Schedule | Cost | Schedule | | | |
| 1 | Drawn out EFSB approval of Jepson substation relocation. | 3 | 3 | 5 | 9 | 9 | Mitigate | Project Manager/RDW | Meet with abutters during stakeholder outreach process to discuss mitigative measures. |
| 2 | Limited opportunities for outage for Line 63 Loop construction. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Schedule construction to finish during off peak period. |
| 3 | Construction delays due to poor weather or damage from major storms. | 2 | 3 | 3 | 6 | 6 | Accept | Project Manager | Create some slack within the schedule |
| 4 | Limited opportunities for outage for Newport Substation connection to Line 63. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Gate 2 has a breaker position that may be used to prevent the need for or an outage. Working with the engineering team to decide best options to eliminate the need for an outage. |
| 5 | Drawn out EFSB approval of Line 61/62 conversions. | 3 | 1 | 5 | 6 | 9 | Mitigate | Legal/RDW/PM | Public outreach consultant (RDW) has been brought onto the project team. |
| 6 | Limited opportunities for Line 61/62 outages for construction cutovers. | 4 | 1 | 3 | 4 | 12 | Mitigate | Project Manager/Construction Supervisor | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Construction will be scheduled so that cutovers will be performed during off peak periods. |
| 7 | Limited opportunities for Jepson Substation construction cutovers. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. |
| 8 | Limited opportunities for distribution system outages for cutovers during construction. | 5 | 1 | 5 | 5 | 9 | Mitigate | Project Manager | An outage coordination consultant will be brought onto the project team. |
| 9 | Change in ADA clearance requirement from 3' to 4' during design/construction | 2 | 2 | 2 | 4 | 4 | Avoid | Project Manager/Legal | Obtain construction permits from DOT early prior to possible change in ADA regulations. |
| 10 | Construction delays due to other utilities not transferring their lines within the project schedule. | 4 | 1 | 3 | 4 | 12 | Avoid | Project Manager/Construction Supervisor | Coordinate construction plan with Verizon during constructability review process. Coordination during design has started and will be maintained through project. |
| 11 | General public opposition to the project. | 3 | 2 | 4 | 6 | 12 | Mitigate | RDW/PM/Outreach Group | Public outreach consultant (RDW) has been brought onto the project team. Project information (facts sheets/talking points) for all projects on Aquidneck Island to be developed. |
| 12 | Negative impacts to wetlands contained on Jepson substation parcel during construction/relocation. | 2 | 2 | 2 | 4 | 4 | Mitigate | VHB/Substation Engineering/Construction Supervisor | VHIB has delineated all wetlands and will ID construction mitigation requirements. Design will account for minimizing wetlands impacts. Construction activities will need to follow SESC measures. |
| 13 | FAA may require certain mitigative measures for construction near Newport Airport. | 3 | 2 | 1 | 6 | 6 | Accept | Distribution Design | Submit required documentation for each pole to be installed early in the design process. |
| 14 | Majority of the distribution and subtransmission work is on well traveled roadways. | 5 | 3 | 1 | 9 | 5 | Accept | Distribution Line Construction/Contractor | Develop traffic control and detour plans for the project and perform extensive coordination with the DOT and cities/towns. |
| 15 | Numerous poles appear to be encroaching on private property and easements/rights are believed to not have been obtained. | 4 | 1 | 1 | 2 | 2 | Accept | Real Estate/PM | Budget and time to be allocated to obtain proper rights/easements as required. |
| 16 | Approval to install 2 additional steel poles within the existing easement with US Navy along Line 63 involves extensive coordination and takes a significant amount of time to get the necessary approvals. | 5 | 1 | 5 | 5 | 9 | Accept | Real Estate/PM | Early coordination with the navy has begun and will continue so as to mitigate the issue prior to commencement of construction. |
| 17 | Approval from US Navy for Gate 2 substation work is required from base commander. Construction work at the substation is schedule to begin in mid 2015 | 5 | 1 | 5 | 5 | 9 | Accept | Real Estate/PM | Early coordination with the Navy has begun in order to mitigate this issue. |
| 18 | Limited construction windows for work in Middletown and Newport. | 4 | 2 | 5 | 8 | 9 | Accept | Project Manager | Extensive coordination of all construction activities and schedule, traffic management plan, detour plans etc will be necessary in advance of any construction work. |



US Sanction Paper

3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|---|--|----------------------------|--|---------------------------|
| RIDEM Permit | Likely | 6 months | Not Applied For | TBD |
| Newport - Special Use Permit | Certain | 7 months | Not Applied For | 10/31/17 |
| EFSB Permit Approval – Jepson substation and 61/62 line Upgrade | Likely | 12 to 18 months | In-progress | 03/31/17 |
| Road Opening Permit | Certain | 3 months | Not Applied For | TBD |
| Building Permit | Certain | 4 months | Not Applied For | TBD |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by the appropriate agencies.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$9.247M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

N/A



US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table: Distribution Project

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total |
|------------------------|---------------------------|----------------------------|-------------|-----------|--------------------------|---------|---------|---------|---------|---------|--------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | | | | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | |
| C028626 | Newport SubTran & Dist | Est Lw (e.g +/- 25%) | CapEx | 0.752 | 2.022 | 3.620 | 3.620 | 3.620 | 0.000 | 0.000 | 13.634 |
| | | | OpEx | 0.011 | 0.213 | 0.272 | 0.272 | 0.453 | 0.000 | 0.000 | 1.221 |
| | | | Removal | 0.022 | 0.426 | 0.634 | 0.634 | 0.453 | 0.000 | 0.000 | 2.169 |
| | | | Total | 0.785 | 2.661 | 4.526 | 4.526 | 4.526 | 0.000 | 0.000 | 17.024 |
| CD00649 | Gate 2 Substation | Est Lw (e.g +/- 25%) | CapEx | 1.804 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.804 |
| | | | OpEx | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.051 |
| | | | Removal | 0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.035 |
| | | | Total | 1.890 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.890 |
| C024159 | Newport 69kV line 63 | Est Lw (e.g +/- 25%) | CapEx | 0.156 | 0.093 | 0.108 | 0.855 | 0.000 | 0.000 | 0.000 | 1.212 |
| | | | OpEx | 0.000 | 0.000 | 0.007 | 0.052 | 0.000 | 0.000 | 0.000 | 0.059 |
| | | | Removal | 0.000 | 0.000 | 0.016 | 0.124 | 0.000 | 0.000 | 0.000 | 0.140 |
| | | | Total | 0.156 | 0.093 | 0.131 | 1.031 | 0.000 | 0.000 | 0.000 | 1.411 |
| C054054 | Jepson Sub | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.320 | 0.078 | 2.580 | 1.940 | 1.523 | 0.000 | 6.441 |
| | | | OpEx | 0.000 | 0.000 | 0.001 | 0.040 | 0.030 | 0.024 | 0.000 | 0.095 |
| | | | Removal | 0.000 | 0.000 | 0.001 | 0.040 | 0.030 | 0.024 | 0.000 | 0.095 |
| | | | Total | 0.000 | 0.320 | 0.080 | 2.660 | 2.000 | 1.571 | 0.000 | 6.631 |
| C015158 | Newport Sub | Est Lw (e.g +/- 25%) | CapEx | 1.124 | 1.028 | 1.153 | 3.943 | 1.944 | 0.000 | 0.000 | 9.192 |
| | | | OpEx | 0.001 | 0.044 | 0.050 | 0.170 | 0.840 | 0.000 | 0.000 | 1.105 |
| | | | Removal | 0.000 | 0.033 | 0.037 | 0.127 | 0.063 | 0.000 | 0.000 | 0.260 |
| | | | Total | 1.125 | 1.105 | 1.240 | 4.240 | 2.847 | 0.000 | 0.000 | 10.557 |
| C054052 | N. Aquidneck Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.032 | 0.010 | 0.110 | 0.180 | 0.000 | 0.000 | 0.332 |
| | | | Total | 0.000 | 0.032 | 0.010 | 0.110 | 0.180 | 0.000 | 0.000 | 0.332 |
| C058310 | Harrison Sub Improvement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.023 | 0.151 | 0.100 | 0.000 | 0.000 | 0.274 |
| | | | OpEx | 0.000 | 0.000 | 0.012 | 0.025 | 0.015 | 0.000 | 0.000 | 0.052 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.000 | 0.035 | 0.176 | 0.115 | 0.000 | 0.000 | 0.326 |
| C058401 | Merton Sub Improvements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.052 | 0.023 | 0.155 | 0.104 | 0.000 | 0.000 | 0.334 |
| | | | OpEx | 0.000 | 0.000 | 0.012 | 0.025 | 0.016 | 0.000 | 0.000 | 0.053 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.052 | 0.035 | 0.180 | 0.120 | 0.000 | 0.000 | 0.387 |
| C058404 | Kingston Sub Improvements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.114 | 0.212 | 0.162 | 0.000 | 0.000 | 0.488 |
| | | | OpEx | 0.000 | 0.000 | 0.011 | 0.053 | 0.043 | 0.000 | 0.000 | 0.107 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.000 | 0.125 | 0.265 | 0.205 | 0.000 | 0.000 | 0.595 |
| C058407 | S. Aquidneck Retirements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.032 | 0.020 | 0.110 | 0.180 | 0.000 | 0.000 | 0.342 |
| | | | Total | 0.000 | 0.032 | 0.020 | 0.110 | 0.180 | 0.000 | 0.000 | 0.342 |
| CD00651 | Bailey Brook Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.003 | 0.040 | 0.040 | 0.150 | 0.230 | 0.000 | 0.000 | 0.463 |
| | | | Total | 0.003 | 0.040 | 0.040 | 0.150 | 0.230 | 0.000 | 0.000 | 0.463 |
| CD00652 | Vernon Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.023 | 0.109 | 0.108 | 0.000 | 0.000 | 0.240 |
| | | | OpEx | 0.000 | 0.000 | 0.003 | 0.014 | 0.014 | 0.000 | 0.000 | 0.031 |
| | | | Removal | 0.000 | 0.000 | 0.003 | 0.014 | 0.014 | 0.000 | 0.000 | 0.031 |
| | | | Total | 0.000 | 0.000 | 0.029 | 0.137 | 0.136 | 0.000 | 0.000 | 0.302 |
| CD00656 | Jepson Substation | Est Lw (e.g +/- 10%) | CapEx | 0.135 | 0.161 | 0.105 | 4.080 | 4.000 | 4.000 | 0.000 | 12.481 |
| | | | OpEx | 0.000 | 0.020 | 0.013 | 0.510 | 0.500 | 0.500 | 0.000 | 1.543 |
| | | | Removal | 0.000 | 0.020 | 0.013 | 0.510 | 0.500 | 0.500 | 0.000 | 1.543 |
| | | | Total | 0.135 | 0.201 | 0.131 | 5.100 | 5.000 | 5.000 | 0.000 | 15.567 |
| Total Project Sanction | | | CapEx | 3.971 | 3.676 | 5.247 | 15.705 | 11.978 | 5.523 | 0.000 | 46.100 |
| | | | OpEx | 0.063 | 0.277 | 0.381 | 1.161 | 1.911 | 0.524 | 0.000 | 4.317 |
| | | | Removal | 0.060 | 0.583 | 0.774 | 1.819 | 1.650 | 0.524 | 0.000 | 5.410 |
| | | | Total | 4.094 | 4.536 | 6.402 | 18.685 | 15.539 | 6.571 | 0.000 | 55.827 |



US Sanction Paper

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|---------------|
| | | Yr. 1 2016/17 | Yr. 2 2017/18 | Yr. 3 2018/19 | Yr. 4 2019/20 | Yr. 5 2020/21 | Yr. 6 + 2021/22 | |
| \$M | | | | | | | | |
| CapEx | 3.971 | 2.882 | 7.225 | 16.687 | 11.600 | 1.200 | 0.000 | 43.565 |
| OpEx | 0.063 | 0.190 | 0.426 | 1.088 | 0.783 | 0.036 | 0.000 | 2.586 |
| Removal | 0.060 | 0.361 | 0.544 | 1.499 | 1.508 | 0.024 | 0.000 | 3.996 |
| Total Cost in Bus. Plan | 4.094 | 3.433 | 8.195 | 19.274 | 13.891 | 1.260 | 0.000 | 50.147 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2016/17 | Yr. 2 2017/18 | Yr. 3 2018/19 | Yr. 4 2019/20 | Yr. 5 2020/21 | Yr. 6 + 2021/22 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | (0.794) | 1.978 | 0.982 | (0.378) | (4.323) | 0.000 | (2.535) |
| OpEx | 0.000 | (0.087) | 0.045 | (0.073) | (1.128) | (0.488) | 0.000 | (1.731) |
| Removal | 0.000 | (0.222) | (0.230) | (0.320) | (0.142) | (0.500) | 0.000 | (1.414) |
| Total Cost in Bus. Plan | 0.000 | (1.103) | 1.793 | 0.589 | (1.648) | (5.311) | 0.000 | (5.680) |

3.11.3 Cost Assumptions

Substation estimates were obtained from Conceptual Engineering Reports prepared by substation engineering. Conceptual Grade Estimates have been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The estimate for the 69kV transmission line was obtained from Routing Analysis Report prepared by transmission line engineering and consultants to the company. This Conceptual Engineering Estimate has been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The overall distribution line work estimate was developed utilizing generic construction costs. Minimal field work has been performed to assess the actual condition of the assets or the number of poles and transformers needing replacement associated with the conversion from 4kV to 13kV. This is an Investment Grade Estimate with a level of accuracy ranging from -50% to +200%.for

The estimates for the distribution work to be completed under funding C028628 and CD00649 are based on STORMS estimate.

3.11.4 Net Present Value / Cost Benefit Analysis

N/A



US Sanction Paper

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

None

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Role | Individual | Responsibilities |
|----------------------------|-------------------|---|
| Investment Planning | Glen DiConza | Endorses relative to distribution 5-year business plan or emergent work |
| Resource Planning | Anne Wyman | Endorses D-Line resources, cost estimate, schedule and portfolio alignment |
| Resource Planning | Mark Phillips | Endorses substation resources, cost estimate, schedule and portfolio alignment |
| Asset Management/ Planning | Kasia Kulbacka | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Asset Management/ Planning | Alan Labarre | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Engineering / Design | Suzan Martuscello | Endorses substation scope, design, conformance with design standards |
| Engineering / Design | Mark Browne | Endorses sub-transmission line scope, design, conformance with design standards |
| Engineering / Design | Len Swanson | Endorses substation scope, design, conformance with design standards |
| Project Management | Andrew Schneller | Endorses Resources, cost estimate, schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|--------------------------|---------------------------------|
| Finance | Keith Fowler / Phillip Horowitz |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegates | Jim Patterson |
| Procurement | Art Curran |
| Control Center | Michael Gallagher |
| Control Center | Will Houston |



US Sanction Paper

4 Appendices

4.1 Sanction Request Breakdown by Project

| \$M | C028628 | CD00649 | C024159 | C054054 | C015158 | C054052 | C058310 | CD00656 | CD00652 | CD058404 | C058407 | C058401 | CD00651 | Total |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|---------|--------|
| CapEx | 5.623 | 2.200 | 0.200 | 0.800 | 1.000 | | 0.050 | 2.100 | | 0.600 | | 0.050 | | 12.623 |
| OpEx | 0.423 | | | | | | | | | | | | | 0.423 |
| Removal | 0.647 | 0.044 | | | | 0.050 | | | 0.050 | | 0.050 | | 0.050 | 0.891 |
| Total | 6.693 | 2.244 | 0.200 | 0.800 | 1.000 | 0.050 | 0.050 | 2.100 | 0.050 | 0.600 | 0.050 | 0.050 | 0.050 | 13.937 |

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

A Customer Outreach is ongoing as part of the Energy Facilities Siting Board (EFSB) Filing process. The company has hired a consultant to develop a comprehensive public outreach plan for all of proposed projects on Aquidneck Island.

This outreach effort will be part of a comprehensive and proactive public outreach process to establish and maintain communications with stakeholders (e.g., project abutters, residents, businesses, federal, state and local officials, and community groups).

This process will include opportunities for public education and communication regarding the need for the Project, the permitting and siting processes, the detailed construction plans, the dissemination of construction updates and outreach prior to and during construction, and follow-up outreach after Project completion. The process will be designed to engage the community in a two-way dialogue, facilitate transparency throughout the Project, foster public participation, and solicit feedback from stakeholders.

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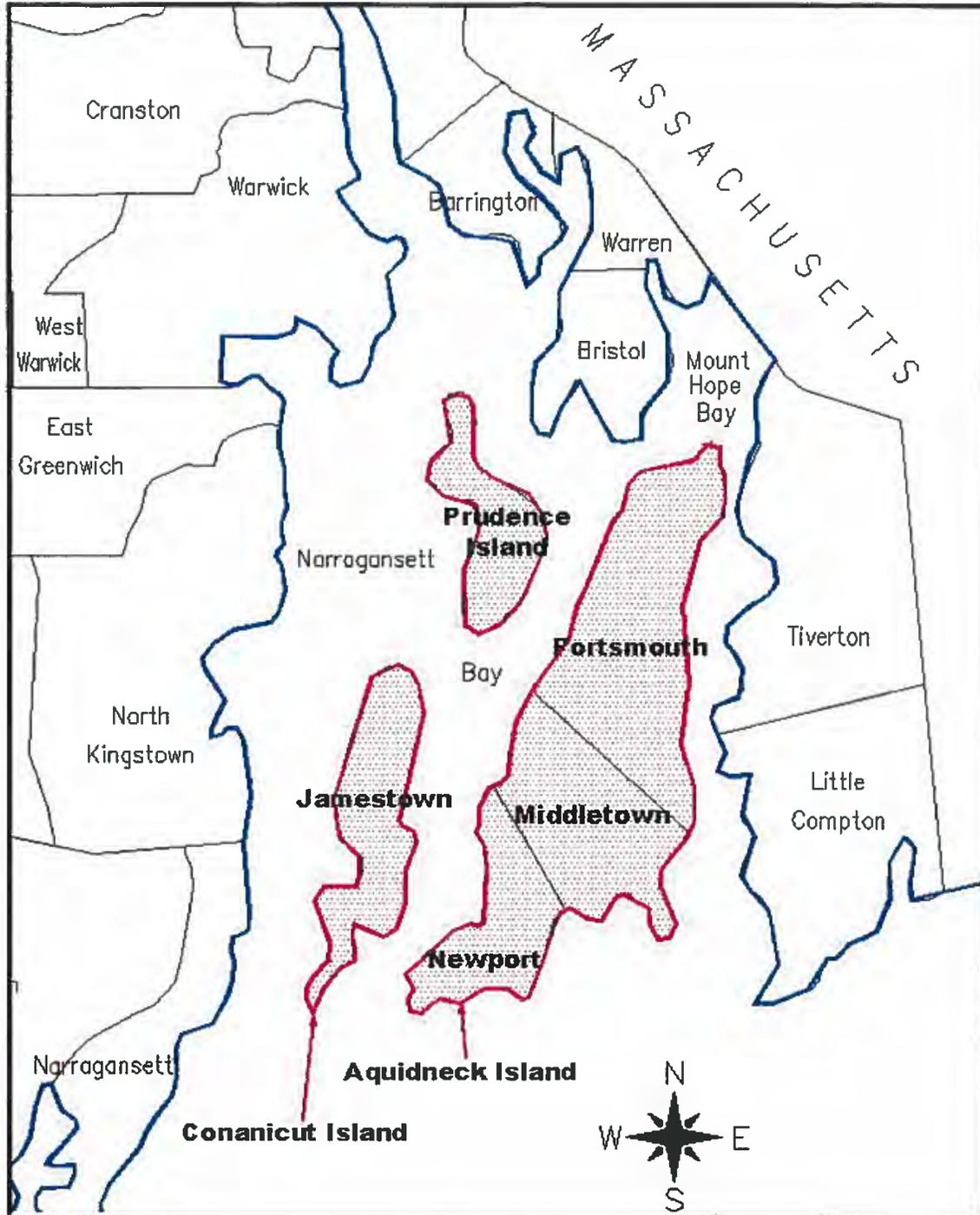
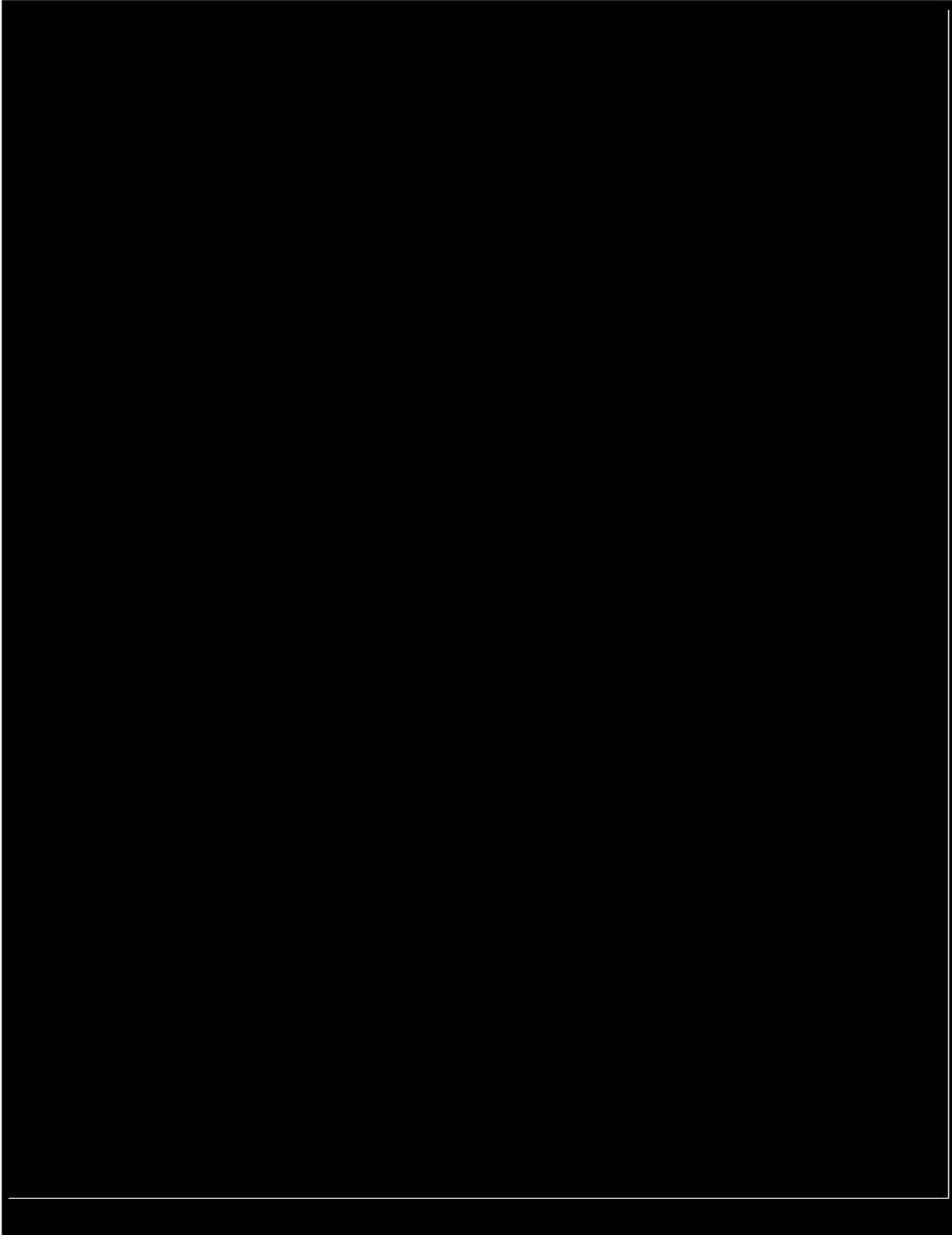


FIGURE 1 – GEOGRAPHIC AREA MAP

US Sanction Paper

nationalgrid



US Sanction Paper

nationalgrid

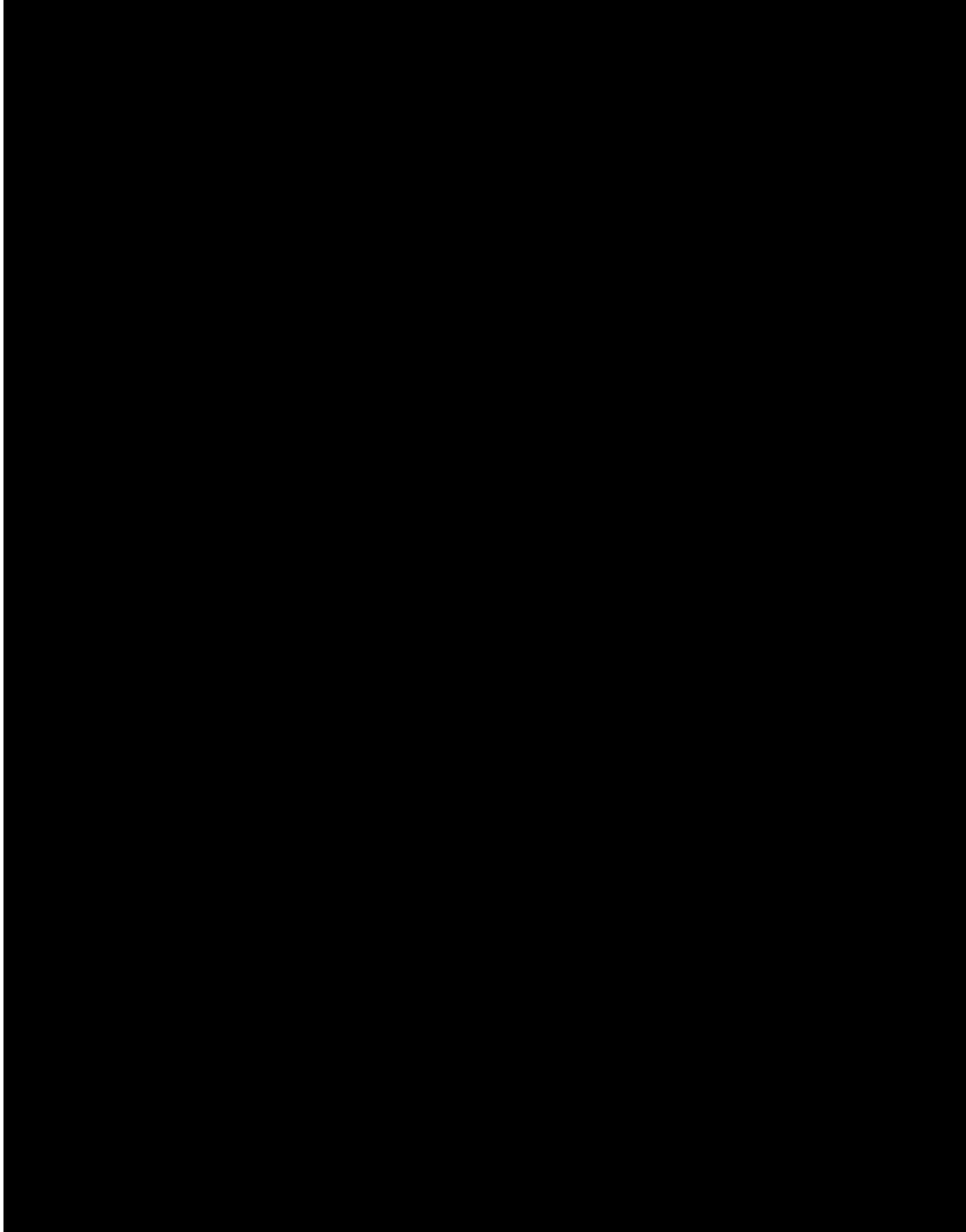


FIGURE 3 – EXISTING SUB-TRANSMISSION SYSTEM ONE-LINE DIAGRAM

US Sanction Paper

nationalgrid

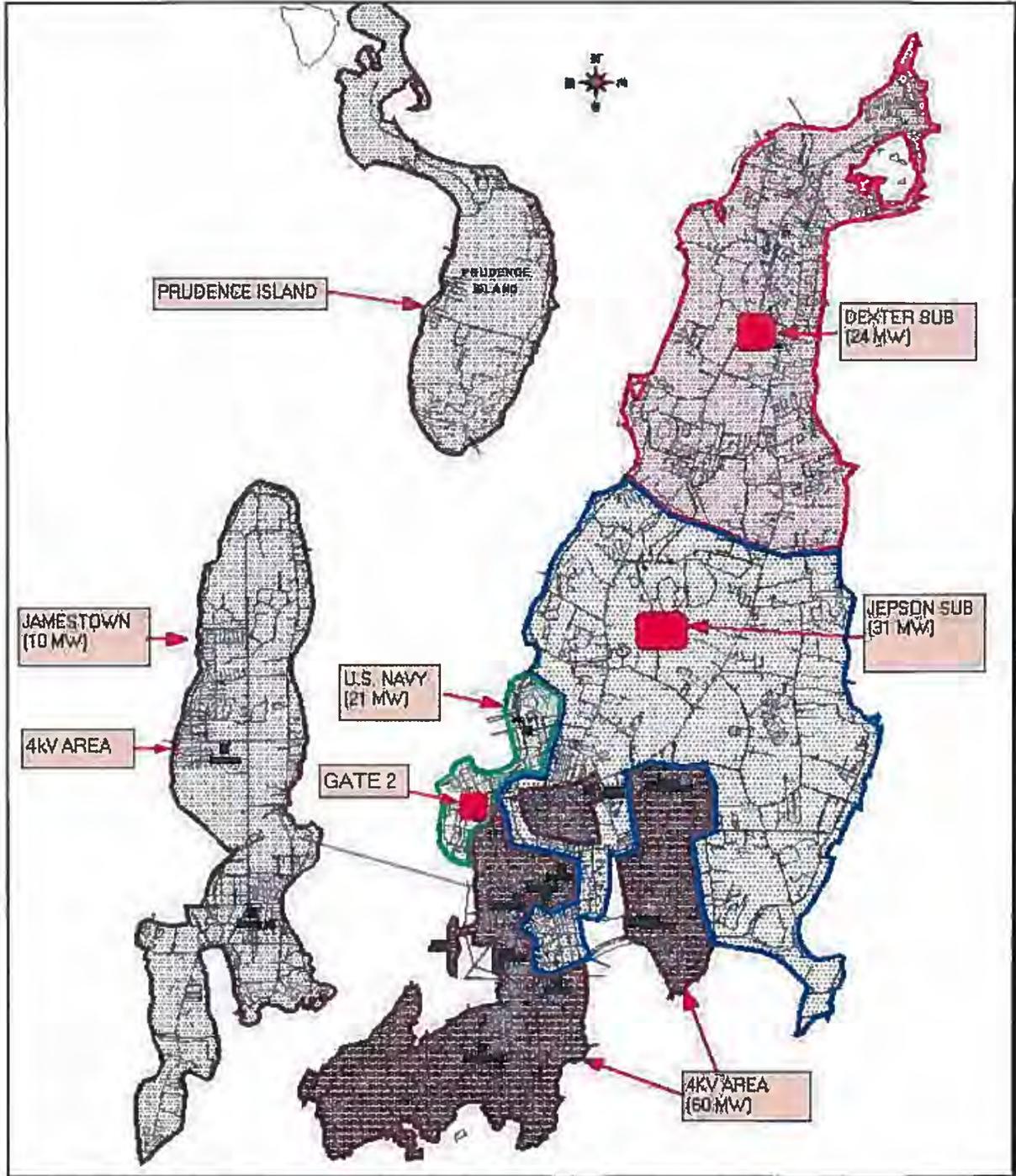


FIGURE 4 – GEOGRAPHIC MAP OF EXISTING DISTRIBUTION

US Sanction Paper

nationalgrid

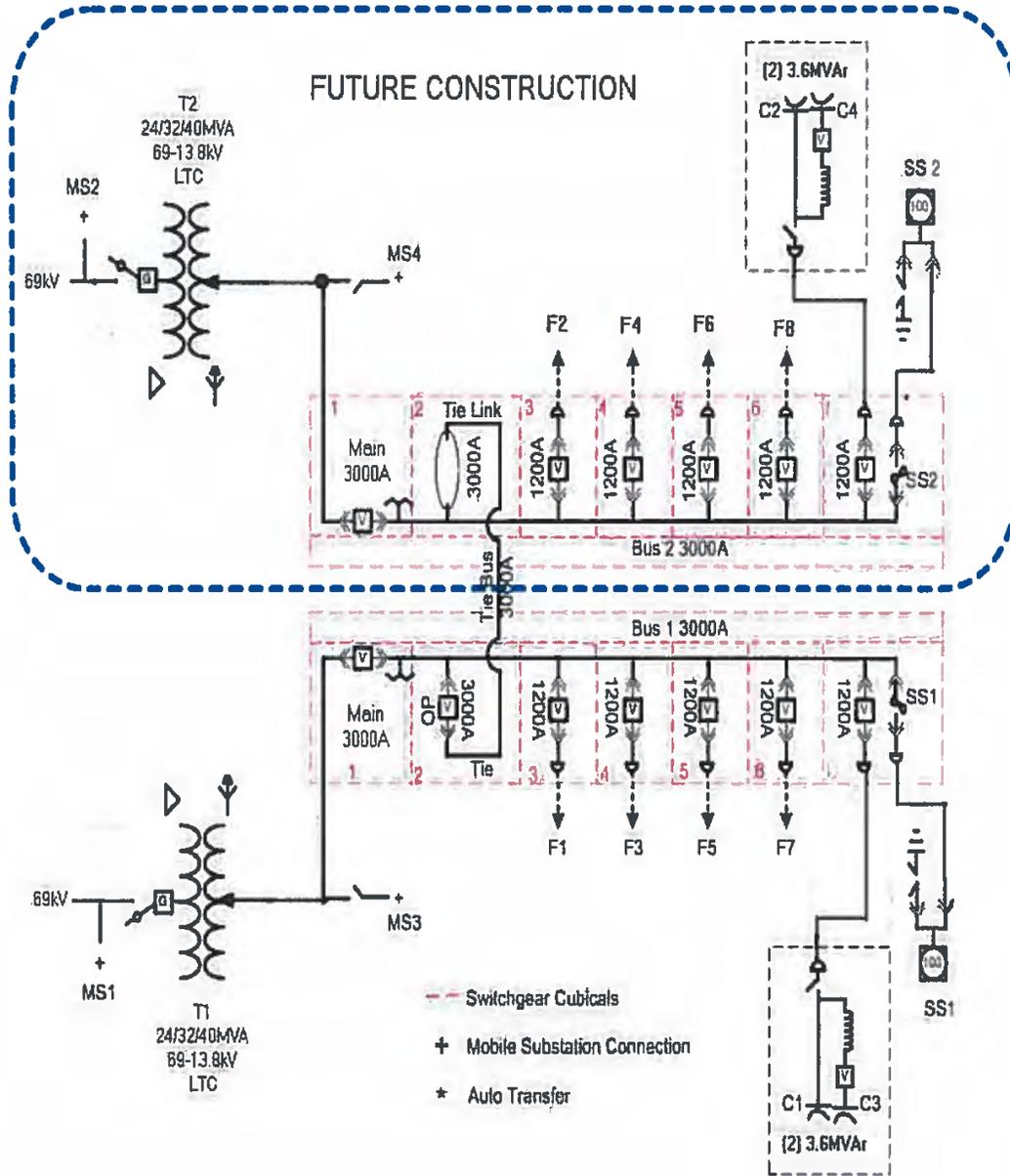


FIGURE 5 – NEWPORT 69/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

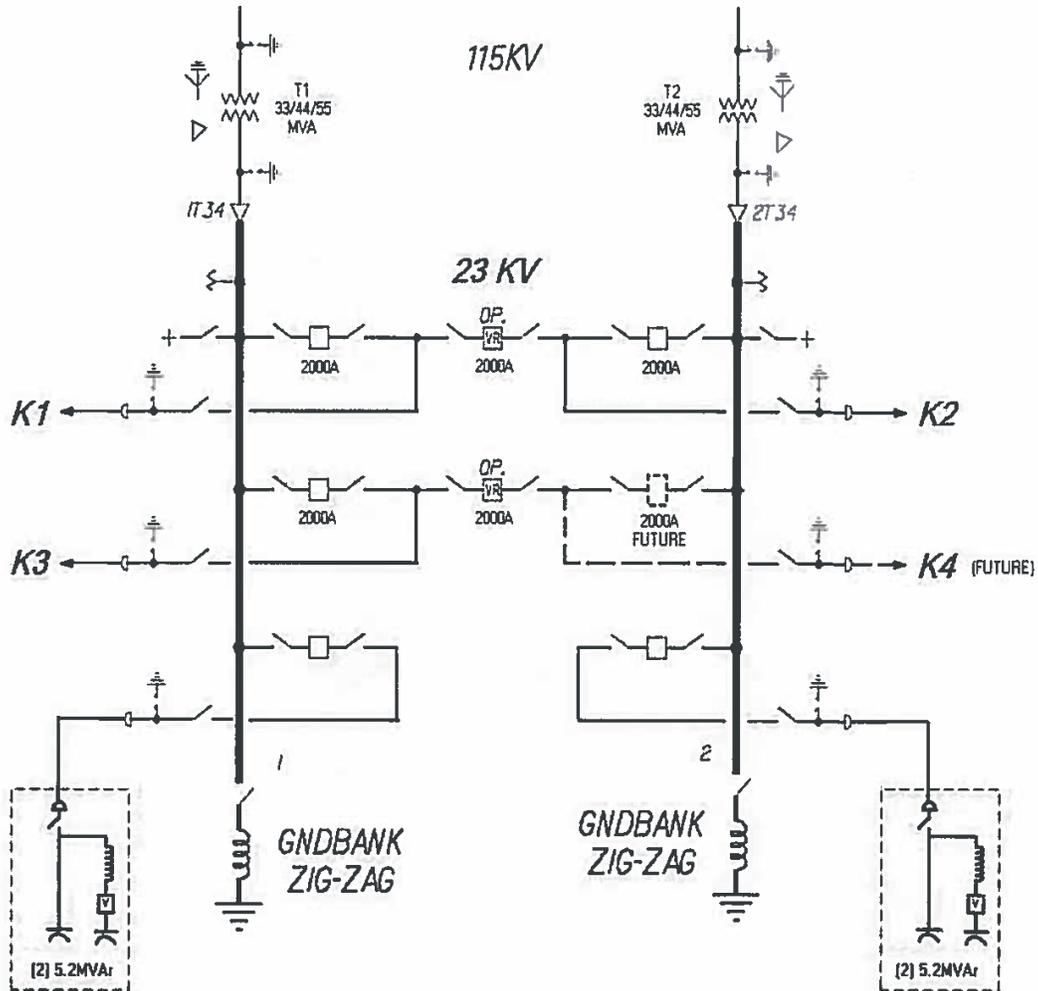


FIGURE 6 – MIDDLETOWN 115/23kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

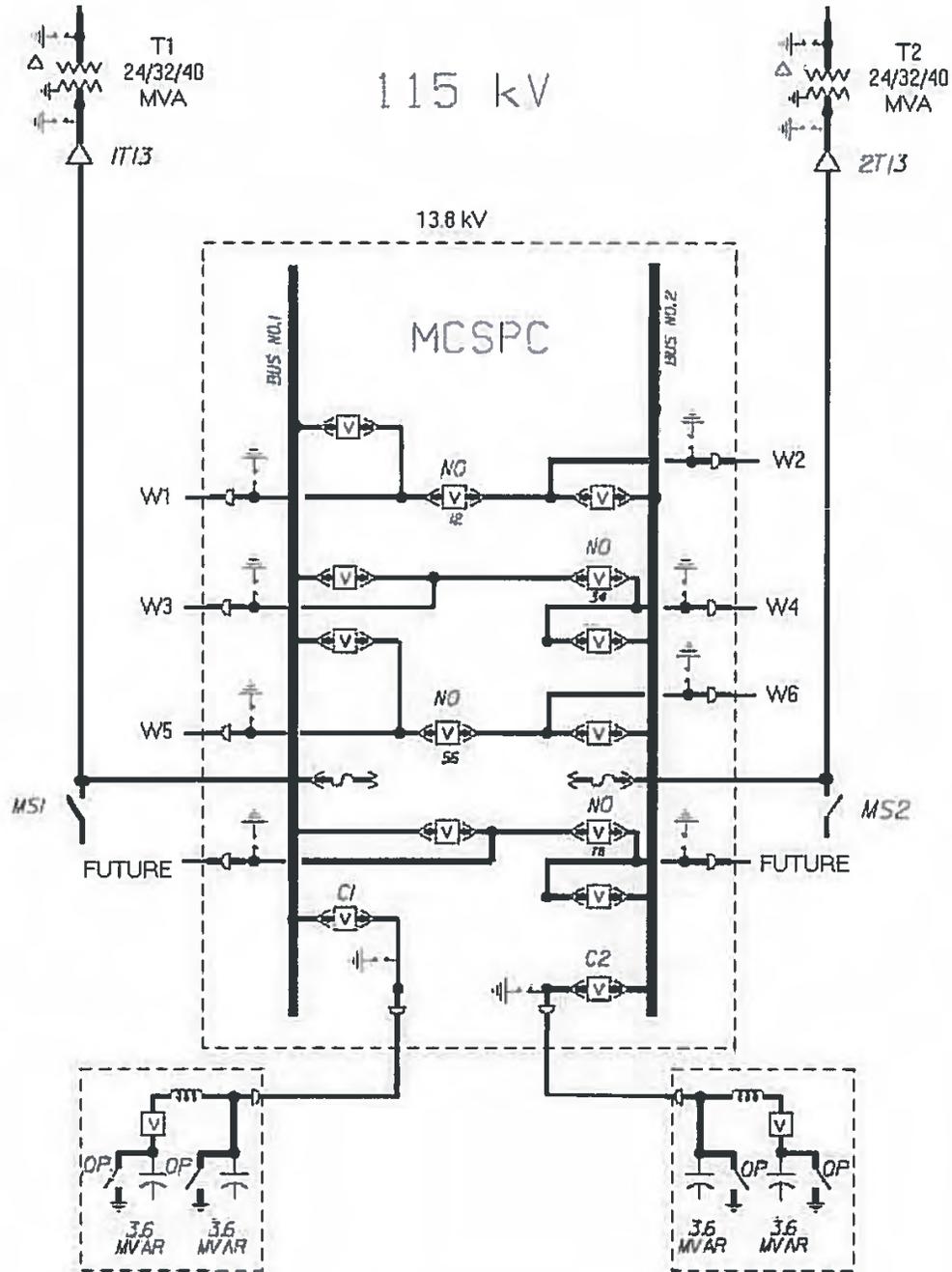


FIG 7 – MIDDLETOWN 115/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

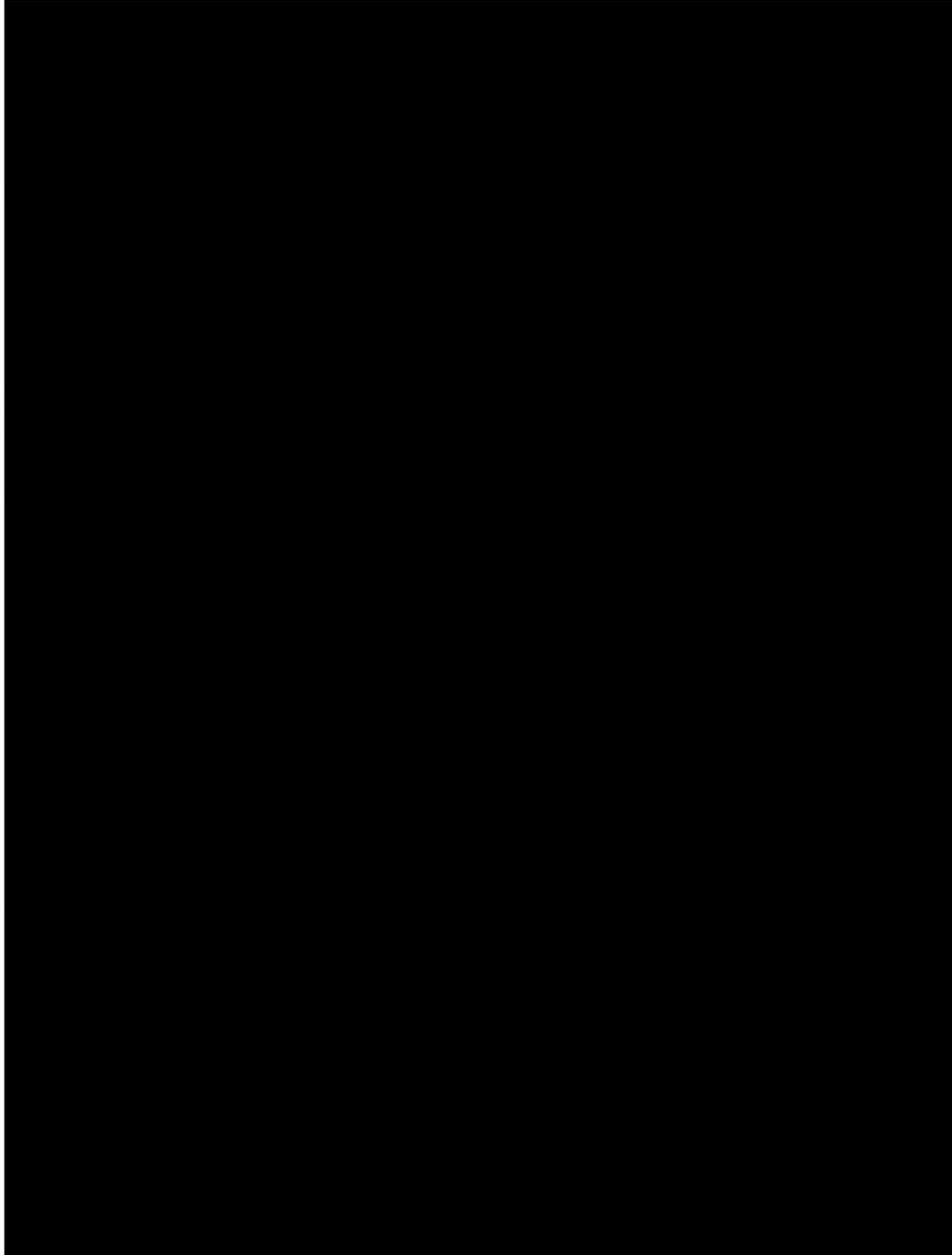


FIGURE 8 – PROPOSED STATION RETIREMENTS

US Sanction Paper

nationalgrid

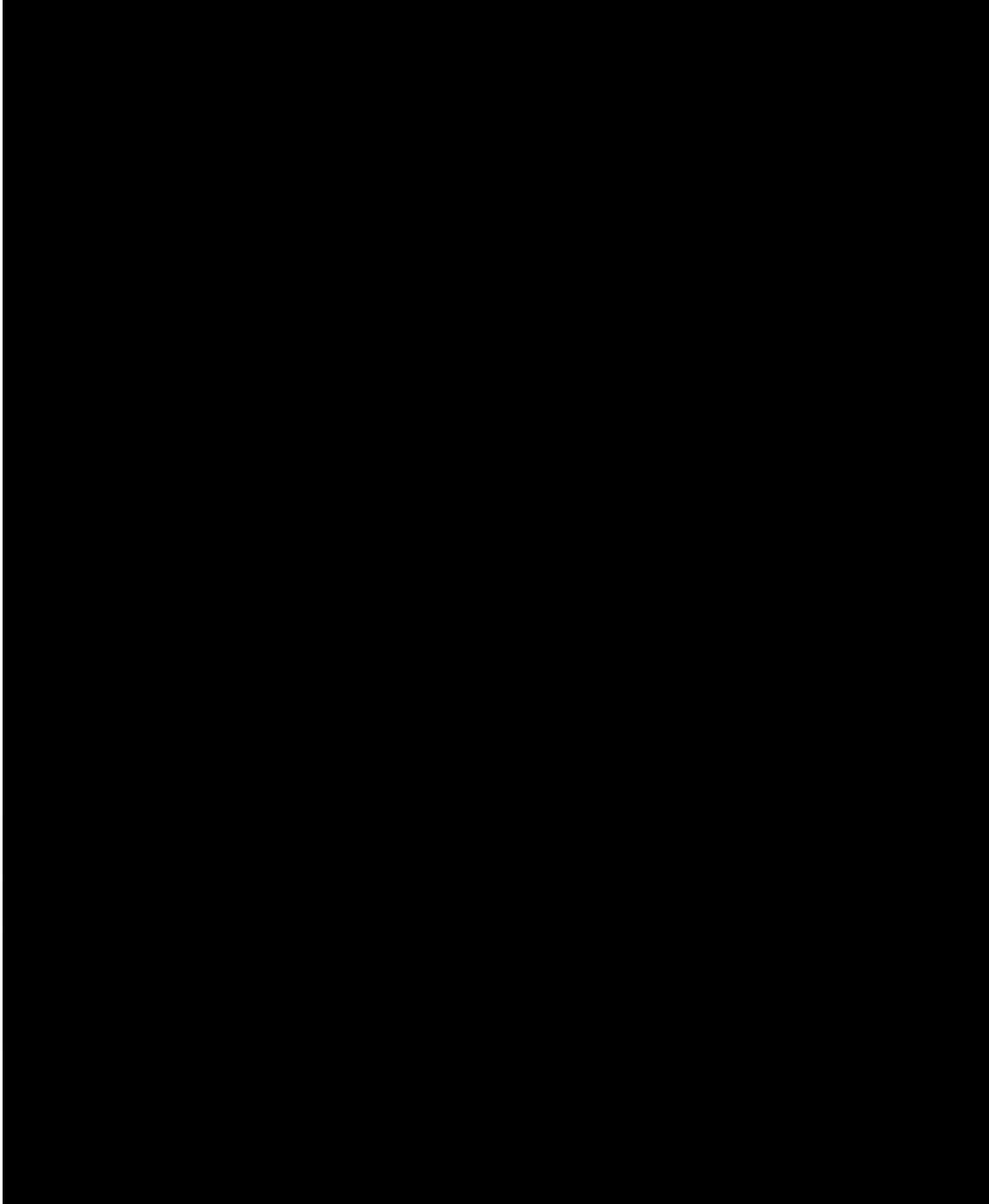


FIG 9 – PROPOSED SUBTRANSMISSION SYSTEM ONE-LINE

C020297

Sac AB Repl Phase 7 NEC

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|---|---------------------------------------|
| Fund Project Number: <u>C020297</u> | USSC #: <u>USSC-14-082</u> |
| Revision: <u>13</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Sac AB Repl Prog Phase 7 NEC DxT</u> | |
| Project Description: <u>03740 Sac AB Repl Prog Phase 7 NEC DxT</u> | |

| | |
|---|---|
| Project Status: <u>Closed</u> | |
| Responsible Person: <u>KELLY, MICHAEL</u> | Initiator: <u>McGrath, James M</u> |
| Spending Rationale: <u>Asset Condition</u> | Funding Type: <u>P Dist by Transmission Sub RI</u> |
| Budget Class: <u>Asset Replacement</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>49</u> | Project Complexity Score: <u>15</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|-----------------------|--|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>1/1/2007</u> | | | Est Complete Date: <u>8/31/2014</u> | | |
| Est In-Service Date: <u>8/31/2014</u> | | | | | |
| TTD Actuals: <u>\$1,017,988</u> | | | As Of: <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$955,000</u> | <u>\$83,000</u> | <u>\$89,000</u> | <u>\$1,127,000</u> | <u>\$0</u> |

Justification / Risk Identification:
 03740 Sac AB Repl Prog Phase 7 NEC DxT

Project Scope:
 03740 Sac AB Repl Prog Phase 7 NEC DxT

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|---------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>4/28/2014 11:02:48</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C020297 Current Total Authorized Amount: \$1,12...

Title

Project Number

| | |
|----------------------------|-----------------------|
| Budget Version | Default (active) |
| Revision | 14-082 |
| Revision Status | Approved |
| Revision No. | 13 |
| Est Start Date | 01/01/2007 |
| Est Complete Date | 08/31/2014 |
| Est In Srvc Date | 08/31/2014 |
| Capital | \$955,000.00 |
| Expense | \$83,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$89,000.00 |
| Total (excl. Rets.) | \$1,127,000.00 |
| Credits | \$0.00 |
| Net | \$1,127,000.00 |

Revision Info

Revision of 13

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Edit:

Property Estimates:

Other:

Record of 1

This document has been reviewed for Critical Energy Infrastructure Information (CEII).



Short Form Sanction Paper

| | | | |
|---------------------------|--|--------------------------|-------------------------------|
| Title: | Sacrificial Airbreak Replacement at Wood River & West Cranston | Sanction Paper #: | USSC-14-082 |
| Project #: | C020297 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | April 1 st , 2014 |
| Author: | Michael Kelly | Sponsor: | Cheri Warren |
| Utility Service: | Electricity T&D | Project Manager: | Michael Kelly / Mark Phillips |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of *Project Funding Number C20297* in the amount **\$1.127M** with a tolerance of +/- 10% for the purposes of procurement of materials, removal of existing Sacrificial Air-breaks, installation of new Circuit Switchers, reinforcement of supporting lattice structures, testing & commissioning as well as closeout procedures for this project, covering work at both the West Cranston & Wood River substations.

This sanction amount is \$1.127M broken down into:

- \$0.955M Capex*
- \$0.083M Opex*
- \$0.089M Removal*

1.2 Project Summary

The Project will include the replacement of the 172T2 & 171T1 Sacrificial Air-breaks at the West Cranston substation as well as the 10T115 & 20T115 Sacrificial Air-breaks at the Wood River Substation in addition to all structural modifications required for the new Circuit Switchers.



Short Form Sanction Paper

2 Project Detail

2.1 Background

Sacrificial Air-break schemes were historically applied for the protection of substation power transformers. However, when subjected to a fault condition, the slow clearing time of sacrificial air-breaks has been shown to be a cause of reduced reliability and damage to substation equipment.

2.2 Drivers

The driver for this work has been identified as Reliability in the Northeast Transmission Sacrificial Air-breaks Strategy Paper, SG 001.

In 1992 a study was commissioned by New England Electric System (NEES) concluded that the inherent slow clearing time of Sacrificial Air-breaks is the primary cause of extensive damage due to a substation fault. The excessive clearing time of 2.5 to 3 seconds to clear such a fault often results in extensive damage to equipment in the local vicinity as well as the possible destruction of the switch itself.

By comparison, Circuit Switchers which replace the Sacrificial Air-breaks, clear a fault in less than 0.1 seconds in addition to numerous other benefits such as being easier to maintain, safer to operate, and possessing the ability to be controlled remotely.

Difficulties with standard operation and maintenance of Sacrificial Air-breaks have been an issue for some time. Infrared review of the devices provides evidence of thermally weak "hot spots" on the equipment.

2.3 Project Description

The new Circuit Switchers are being provided as part of the Sacrificial Air-break Replacement Program which is considered non-mandatory/policy driven.

This project provides for the replacement of the 171T1 and 172T2 Sacrificial Air-breaks at the West Cranston substation as well as the 10T115 & 20T115 Sacrificial Air-breaks at the Wood River Substation with Circuit Switchers. New primary bus will be installed to interconnect the Circuit Switchers with the 115 kV incoming lines and the transformers. The existing structures supporting the Sacrificial Air-break switches will be reinforced for the new Circuit Switchers.



Short Form Sanction Paper

2.4 Benefits

Installation of the new Circuit Switchers to replace existing Sacrificial Air-breaks will significantly decrease fault clearing time which will limit potential damage to associated substation equipment. Benefits include increased reliability and safety.

2.5 Business & Customer Issues

Detailed plans are being developed to minimize any disruption to customers & transmission lines. The installation of modern Circuit Switchers in replacement of problematic Sacrificial Air-breaks will lead to improved reliability performance providing our customers with improved service. Planned replacement also offers the lowest lifetime cost approach for customers.

2.6 Alternatives

Alternative 1: Do Nothing

This option would have no initial cost however there will be indirect costs associated with increased maintenance levels. This option would involve no proactive replacement of equipment, only replacing when failure occurs. All Air-breaks should be replaced before the onset of significantly reduced reliability. This option is unacceptable because:

- Leaving degraded Air-breaks in service puts the company and customers at risk of long-term interruptions of the transmission system.
- Failures of this equipment have the potential to cause extensive damage to other equipment as well as serious injuries to our employees.

2.7 Investment Recovery

2.7.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$1.146M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.



Short Form Sanction Paper

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---------------|-----------------------|
| C020297 | Distribution Substation | West Cranston | 0.599 |
| C020297 | Distribution Substation | Wood River | 0.528 |
| Total | | | 1.127 |

3.2 Associated Projects

Not Applicable, no associated projects.

3.3 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Paper Title | Sanction Type |
|---------|-----------------|-------------------|---|---------------|
| 03/1992 | Transmission | - | Transformer Protection SAC AB Study 1992. | - |
| 02/2004 | Transmission | - | SG001 Sacrificial Air-breaks Strategy Paper | - |
| 01/2007 | Transmission | \$0.100M | Electronic DoA | Partial |
| 08/2012 | USSC | \$0.375M | Rhode Island Sacrificial Air-breaks Replacement | Partial |
| 09/2012 | USSC | \$0.280M | Sacrificial Air-breaks Replacement-W.Cranston | Partial |

3.4 Category

| Category | Reference to Mandate, Policy, or NPV Assumptions |
|---|---|
| <input type="radio"/> Mandatory <input checked="" type="radio"/> Policy- Driven <input type="radio"/> Justified NPV | This project is consistent with National Grid's goal of complying with NERC & NPCC reliability criteria and improving reliability for the benefit of our customers. |



Short Form Sanction Paper

3.5 Asset Management Risk Score

Asset Management Risk Score: 49

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability Environment Health & Safety Not Policy Driven

3.6 Complexity Level

- High Complexity Medium Complexity Low Complexity N/A

Complexity Score: 15

4 Financial

4.1 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|---|---|---|--|
| FY 2015-2019 NE Distribution Capital Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.042 M |

4.1.1 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

4.2 CIAC / Reimbursement

| \$M | Prior Yrs | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | Total |
|--------------------|-----------|---------|---------|---------|---------|---------|---------|-------|
| | | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |



Short Form Sanction Paper

4.3 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend | Prior Yrs | Current Planning Horizon (\$M) | | | | | | Total |
|-------------------------------|---------------|----------------------------|--------------|--------------|--------------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | | | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| C020297 | West Cranston | +/- 10% | CapEx | 0.230 | 0.325 | - | - | - | - | - | 0.555 |
| | | | OpEx | 0.015 | 0.005 | - | - | - | - | - | 0.020 |
| | | | Removal | - | 0.024 | - | - | - | - | - | 0.024 |
| | | | Total | 0.245 | 0.354 | - | - | - | - | - | 0.599 |
| C020297 | Wood River | +/- 10% | CapEx | 0.400 | - | - | - | - | - | - | 0.400 |
| | | | OpEx | 0.063 | - | - | - | - | - | - | 0.063 |
| | | | Removal | 0.065 | - | - | - | - | - | - | 0.065 |
| | | | Total | 0.528 | - | - | - | - | - | - | 0.528 |
| Total Project Sanction | | | CapEx | 0.630 | 0.325 | - | - | - | - | - | 0.955 |
| | | | OpEx | 0.078 | 0.005 | - | - | - | - | - | 0.083 |
| | | | Removal | 0.065 | 0.024 | - | - | - | - | - | 0.089 |
| | | | Total | 0.773 | 0.354 | - | - | - | - | - | 1.127 |

4.4 Project Budget Summary Table

Project Costs Per Business Plan

Project Costs per Business Plan

| SM | Prior Yrs (Actual) | Current Planning Horizon (\$M) | | | | | | Total |
|--------------------------------|-----------------------|--------------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| CapEx | 0.630 | 0.081 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.711 |
| OpEx | 0.078 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.081 |
| Removal | 0.065 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.067 |
| Total Cost in Bus. Plan | 0.773 | 0.086 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.859 |

Variance (Business Plan-Project Estimate)

| SM | Prior Yrs (Actual) | Current Planning Horizon (\$M) | | | | | | Total |
|--------------------------------|-----------------------|--------------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| CapEx | 0.000 | (0.244) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | (0.244) |
| OpEx | 0.000 | (0.003) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | (0.003) |
| Removal | 0.000 | (0.022) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | (0.022) |
| Total Cost in Bus. Plan | 0.000 | (0.269) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | (0.269) |



Short Form Sanction Paper

5 Key Milestones

| Milestones | Target Date: (Month/Year) |
|-----------------------|----------------------------------|
| Project Sanction | 04/2014 |
| Construction Start | 04/2014 |
| Construction Complete | 05/2014 |
| Ready For Load | 05/2014 |
| Project Closure | 08/2014 |

6 Statements of Support

6.1.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Role | Name | Responsibilities |
|-----------------------------|---------------|--|
| Investment Planner | Glen DiConza | Endorses relative to 5-year business plan or emergent work |
| Resource Planning | Mark Phillips | Endorses resources, cost estimate, schedule, and Portfolio Alignment |
| Asset Management / Planning | Alan Labarre | Endorses scope, estimate, and schedule with the company's goals, strategies and objectives |
| Engineering and Design | John Gavin | Endorses scope, design, conformance with design standards |
| Project Management | Sonny Anand | Endorses resources, cost estimate, schedule |

6.1.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Reviewer List | Name |
|--------------------------|----------------------|
| Finance | Keith Fowler |
| Regulatory | Gideon N. Katsh |
| Jurisdictional Delegates | Jennifer L. Grimsley |
| Jurisdictional Delegates | Nibil Hitti |
| Procurement | Art Curran |
| Control Centers (CC) | Michael Gallagher |

Short Form Sanction Paper

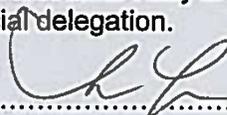
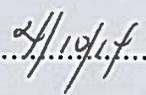


7 Decisions

I:

(a) APPROVE this paper and the investment of \$1.127M and a tolerance of +/-10%

(b) NOTE that Mike Kelly is the Project Manager and Mark Phillips has the approved financial delegation.

Signature..........Date..........

Executive Sponsor – Marie Jordan
Senior Vice President
Network Strategy

C023852

Inst Ductline Governor St. Prov.

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|---|
| Fund Project Number: <u>C023852</u> | USSC #: <u>USSC-13-239-DCIG0109P</u> |
| Revision: <u>6</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Inst Ductline Governor St. Prov.</u> | |
| Project Description: Install 2800' of 12-way manhole and duct system. | |

| | |
|--|---|
| Project Status: <u>open</u> | |
| Responsible Person: <u>PHILLIPS, DANIELLE</u> | Initiator: <u>Castro, Kathy</u> |
| Spending Rationale: <u>Asset Condition</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Asset Replacement</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>30</u> | Project Complexity Score: <u>21</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|--|-----------------------|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>4/1/2008</u> | | Est Complete Date: <u>4/30/2014</u> | | | |
| Est In-Service Date: <u>2/28/2014</u> | | | | | |
| TTD Actuals: <u>\$1,532,781</u> | | As Of: <u>10/2/2017</u> | | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$1,571,000</u> | <u>\$82,000</u> | <u>\$0</u> | <u>\$1,653,000</u> | <u>\$0</u> |

Justification / Risk Identification:

CL 7/7/08 changed project name from "Ives St" to "Governor St," changed scope and est. A new duct/manhole system is being constructed on Governor St in Providence. The new system will provide a route to bypass an existing ductline on nearby Ives St which is unusable due to blistered fiber ducts. The Ives St ductline is a critical corridor for 23 kV supply to 2 substations in Providence's East Side and for 11 kV primary-metered service to Brown University. This project covers expenditures necessary to install the MH/duct system required for proactive replacement of 4070's VLF cable & splice cases insulated lead covered cable on Ives St and to proactively develop a route to

Project Scope:

Install 2800' of 12-way manhole and duct system.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>9/3/2013 09:10:48</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C023852 Current Total Authorized Amount: \$1,65...

Title
Project Number

| |
|---|
| Budget Version <input type="text" value="Default (active)"/> |
| Revision <input type="text"/> |
| Revision Status <input type="text" value="Approved"/> |
| Revision No. <input type="text" value="6"/> |
| Est Start Date <input type="text" value="04/01/2008"/> |
| Est Complete Date <input type="text" value="04/30/2014"/> |
| Est In Srvc Date <input type="text" value="02/28/2014"/> |
| Capital <input type="text" value="\$1,571,000.00"/> |
| Expense <input type="text" value="\$82,000.00"/> |
| Jobbing <input type="text" value="\$0.00"/> |
| Retirement <input type="text" value="\$0.00"/> |
| Removal <input type="text" value="\$0.00"/> |
| Total (excl. Rets.) <input type="text" value="\$1,653,000.00"/> |
| Credits <input type="text" value="\$0.00"/> |
| Net <input type="text" value="\$1,653,000.00"/> |

Revision Info

Revision of 6
[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

D



Short Form Sanction Paper

| | | | |
|---------------------------|---|--------------------------|-------------------|
| Title: | Install Ductline – Governor St., Providence | Sanction Paper #: | USSC-13-239 |
| Project #: | C23852 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 08/20/2013 |
| Author: | Danielle Phillips | Sponsor: | Cheryl A. Warren |
| Utility Service: | Electricity T&D | Project Manager: | Danielle Phillips |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of C23852 in the amount \$1.653M with a tolerance of +/- 10% to proceed with construction activities.

This sanction amount is \$1.653M broken down into:

- \$1.570M Capex*
- \$0.083M Opex*
- \$0.000M Removal*

2 Project Detail

2.1 Project Description, Justification, Customer Issues, Drivers and Benefits

Project Description:

The portion of feeder 1152B on Ives and Manning Streets which consists of 1970's XLPE cable is a candidate for inclusion early in the underground cable replacement program. However, the existing ductline in this area consists of concrete-encased 4" fiber ducts installed in the 1960's. The ducts are severely blistered, making them unusable in their present condition.

This project will install the ducts necessary for future elimination of 1970's XLPE on feeder 1152B, will provide spare ducts for use in the event of cable failures, and will allow for future replacement of aging PILC cable. A new ductline route will allow for future replacement of aging PILC cable. A new ductline route will be developed to bypass the Ives Street ductline, as shown the Appendix.

Background:



Short Form Sanction Paper

An existing ductline on Ives and Manning Streets in Providence, Rhode Island, consists of 4" fiber ducts encased in concrete. The ducts are severely blistered with no usable spare ducts. As shown in Figure 1, the ductline contains two 23kV circuits that supply the East Side of Providence, four 11kV circuits that supply primary metered service to Brown University, two 4kV circuits, and fiber optic cable. Supplying Brown University are feeders 1152B, which in this area is early 1970's cross-linked polyethylene (XLPE) cable; 1153 which is paper-insulated lead-covered (PILC) cable approximately 40 years of age; 1151 which is PILC approximately 20 years of age; and 1126 which is ethylene-propylene rubber (EPR) approximately 4 years of age. The 23 kV supply circuits consists of feeders 2248 and 24 which supply 4 kV substation East George Street. Both feeders are PILC cable in this area and are approximately 40 years of age. Feeder 2248 continues to Rochambeau Avenue substation, which is also supplied by feeder 1110 from Admiral Street.

The most recent attempt to use this ductline was in 2004 when feeder 1126 was installed to Brown University. At that time, one duct for feeder 1126 was made usable by a specialized reaming and cutting process to remove fiber blisters. Because of PCB contamination in the Ives Street manholes, it was not cost-effective to continue the reaming process to create additional usable spare ducts. The presence of PCB's required that the large volume of process water generated by the reaming process be disposed of as PCV waste, which is very costly.

In the event of in-service failure of any one of the feeders in this ductline, emergency duct construction would be required. Such emergency construction would only address an immediate issue (cable failure repairs), and would not provide long-term benefit. A proactive long-term approach to address the unusable ductlines on Ives and Manning Streets is desirable so that ducts are available for use in the event of in-service failure, and for future underground cable asset replacement projects.

Drivers:

The company is undertaking a program to proactively replace underground distribution cable. National Grid Internal Strategy Document "Primary Underground Cable" – Initial Strategy, dated January 2008, sets forth a strategy to eliminate all primary underground cable more than 60 years old from the system within fifteen years. The strategy is intended to provide for a sustainable system going forward. In moving toward a sustainable system, a concerted effort is also being made to eliminate cross-linked polyethylene (XLPE) cables manufactured in the 1970's. This particular vintage XLPE cable insulation is targeted for elimination based on historical performance.

Existing duct and manhole system are used for the underground cable replacements where suitable facilities exist. In some cases, duct construction is required where existing facilities are unsuitable due to duct size, manhole size or physical constraints, or lack of usable ducts. National Grid Internal Strategy Document "Distribution Ducts and Conduit" – Issue 2, dated September 2008, sets forth a strategy to repair and/or



Short Form Sanction Paper

replace failed conduit systems upon evaluation of alternatives and when justified by short and long-term needs.

Ductlines on Ives and Manning Streets are a critical underground corridor for 11kV cables that supply Brown University, and 23kV cables that supply East George Street and Rochambeau Avenue substations. A suitable alternative route to these locations does not exist, and large-scale repair or additions to the existing ductline is neither practicable nor cost-effective because of the number of circuits involved and physical constraints. The Company's strategies for primary underground cable and distribution ducts support implementation of a proactive plan to install the underground facilities necessary for future cable replacement programs in this area, while limiting risk in the event of in-services failures.

Benefits:

There are not direct financial benefits arising from this project. However, replacing the existing ductline will provide a more reliable and sustainable system for the customers.

Business Issues:

Although this project installs ductline and is consistent with the Company's distribution duct strategy, it is being incorporated into the Company's underground cable replacement initiative because it installs the facilities necessary for future cable replacements, both early in the program (1152B-1970's XLPE) and in future years (1153, 2248, 24 – aged PILC cable).

The project proactively addresses the lack of usable spare ducts on Ives and Manning Streets. This underground corridor is critical for supply to Brown University and to the East Side area of Providence.

Safety, Environmental and Project Planning Issues:

One of the manholes on Manning Street has tested positive for PCB-contamination and proper measures are in place for remediation of the PCB-contamination.

Dewatering, if required during duct and manhole construction, will be in accordance with existing Narragansett Bay Commission Permits, and "best management practices" will be implemented as necessary for management of excavation materials and spoil.

The City of Providence is considering enactment of a new ordinance which would apply for construction in the public way in an area including multiple properties, such as a street or multiple streets. The ordinance would require a 60 day review period by the Department of Planning and Development and City Council prior to obtaining road opening permit.



Short Form Sanction Paper

2.1.1 Alternatives:

Alternative 1: Recommended Option

This project will install the ducts necessary for future elimination of 1970's XLPE on feeder 1152B, will provide spare ducts for use in the event of cable failures, and will allow for future replacement of aging PILC cable. A new ductline route will be allowed for future replacement of aging PILC cable. A new ductline route will be developed to bypass the Ives Street ductline, as shown in the Appendix.

Alternative 2: do nothing option.

A "do-nothing" alternative is not recommended because of the risk incurred by the potential for in-service failures. The Ives Street ductline contains all feeders that supply 11kV primary metered service to Brown University and 23kV supply to all of 4 kV substations East George Street and half of 4 kV substations Rochambeau Avenue. In-service failure on Ives or Manning Streets would require long-term emergency loading on the equipment remaining in service. This would result in loss-of-life on the cables remaining in service and, for feeders 2248 and 24, the 11 kV – 23 kV step-up transformers at South Street substation. Such emergency loading would be necessary until duct construction was completed and the failed cable replaced, or until other provisions were made. Use of 4 kV feeders ties to pick up load would be limited since most ties are to feeders also supply from East George and Rochambeau Substations. Use of "roll-on generation" would most likely encounter local opposition since both East George and Rochambeau substations are located in densely-built residential areas. Should one of the cables to Brown University fail during higher load periods, Brown University may be required to shed load for an extended period of time.

Adding ducts to the existing Ives Street ductline is not considered feasible. Because of manhole congestion and physical limitations, the maximum number of ducts that can be added is insufficient to replace all cable targeted for asset replacement as well as provide spare ducts for use in the event of future failures.

2.2 Investment Recovery

The Company franchise to distribute electricity obligates the Company to have the necessary facilities to provide reliable electric service. The proposed investment installs the infrastructure necessary for future proactive replacement of aged and deteriorated underground cable to maintain reliable service and avoid in-service failures. The project fully supports the objective of the Company's Primary Underground Cable Strategy, which seeks to provide for a sustainable system going forward, and the strategy's regulatory/reputation benefit which is risk avoidance for damage to reputation and subsequent regulatory intervention.



Short Form Sanction Paper

2.2.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$0.314M. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects:

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---|-----------------------|
| C23852 | D-Line | Install Ductline – Governor St., Providence | \$ 1.653 |
| Total | | | \$ 1.653 |

3.2 Associated Projects:

| Project Number | Project Title | Estimate Amount |
|----------------|---|----------------------|
| 9000120317 | Gas Main Relay - Governor St., Providence | \$ 656,732.00 |
| Total | | \$ 656,732.00 |

3.3 Prior Sanctioning History (including relevant approved Strategies):

| Date | Governance Body | Sanctioned Amount | Paper Title | Sanction Type |
|------------|-----------------|-------------------|---|----------------------------|
| 01/14/2009 | USSC | \$0.100M | Install Ductline – Governor St., Providence | Preliminary Works Sanction |
| | | | | |
| | | | | |



Short Form Sanction Paper

3.4 Category:

| Category | Reference to Mandate, Policy, or NPV Assumptions |
|---|--|
| <input type="radio"/> Mandatory | The investment is classified as policy-driven. The Company is undertaking an asset replacement program for underground cable to proactively replace aging and deteriorated cable and avoid in-service failures. Such replacements cannot be done on Ives and Manning Streets in Providence without additions to the duct/manhole system. |
| <input checked="" type="radio"/> Policy- Driven | |
| <input type="radio"/> Justified NPV | |

3.5 Asset Management Risk Score

Asset Management Risk Score: 30

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability Environment Health & Safety Not Policy Driven

3.6 Complexity Level:

- High Complexity Medium Complexity Low Complexity N/A

Complexity Score: 18

4 Financial

4.1 Business Plan:

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--------------------------------------|---|--|--|
| NE Distribution and Sub-Transmission | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.512M |



Short Form Sanction Paper

| | | | |
|------------------------------|--|--|--|
| FY14 - FY18 Business Plan | | | |
|------------------------------|--|--|--|

4.1.1 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

4.2 CIAC / Reimbursement

N/A.

4.3 Cost Summary Table

| Project Number | Project Title | Project Estimate | Spend | Prior Yrs | Current Planning Horizon (\$M) | | | | | | Total |
|------------------------|--|------------------|---------|-----------|--------------------------------|------------------|------------------|------------------|------------------|-------------------|-------|
| | | | | | Yr. 1 2013/14 | Yr. 2 2014/15 | Yr. 3 2015/16 | Yr. 4 2016/17 | Yr. 5 2017/18 | Yr. 6+ 2018/19 | |
| C2882 | Instal Outline-Governor St, Providence | 4 | CapEx | 0011 | 1510 | 0080 | - | - | - | - | 1571 |
| | | | OpEx | - | 0082 | - | - | - | - | - | 0082 |
| | | | Renewal | - | - | - | - | - | - | - | - |
| | | | Total | 0011 | 1592 | 0080 | - | - | - | - | 1663 |
| Total Project Sanction | | | CapEx | 0011 | 1510 | 0080 | - | - | - | - | 1571 |
| | | | OpEx | - | 0082 | - | - | - | - | - | 0082 |
| | | | Renewal | - | - | - | - | - | - | - | - |
| | | | Total | 0011 | 1592 | 0080 | - | - | - | - | 1663 |



Short Form Sanction Paper

4.4 Project Budget Summary Table

Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon (\$M) | | | | | | Total |
|--------------------------------|-----------------------|--------------------------------|-------------|-------------|-------------|-------------|-------------|-----------------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| CapEx | \$ 0.010 | \$ 0.100 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 0.110 |
| OpEx | \$ - | \$ 0.015 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 0.015 |
| Removal | \$ - | \$ 0.015 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 0.015 |
| Total Cost in Bus. Plan | \$ 0.010 | \$ 0.130 | \$ - | \$ 0.140 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon (\$M) | | | | | | Total |
|--------------------------------|-----------------------|--------------------------------|-------------------|-------------|-------------|-------------|-------------|-------------------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | |
| CapEx | \$ (0.001) | \$ (1.410) | \$ (0.050) | \$ - | \$ - | \$ - | \$ - | \$ (1.461) |
| OpEx | \$ - | \$ (0.067) | \$ - | \$ - | \$ - | \$ - | \$ - | \$ (0.067) |
| Removal | \$ - | \$ 0.015 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 0.015 |
| Total Cost in Bus. Plan | \$ (0.001) | \$ (1.462) | \$ (0.050) | \$ - | \$ - | \$ - | \$ - | \$ (1.513) |

5 Key Milestones:

| Milestone | Target Date: (Month/Year) |
|--------------------------------------|------------------------------|
| Preliminary Engineering Complete | 09/2009 |
| Full Spend Sanction Request Complete | 08/2013 |
| Construction Start Date | 09/2013 |
| Project Completion | 02/2014 |
| Project Closure | 04/2014 |

6 Statements of Support

6.1.1 Supporters

| Role | Name | Responsibilities |
|------------------------|--------------------|--|
| Investment Planner | Glen DiConza | Endorses relative to 5-year business plan or emergent work |
| Resource Planning | Jim Patterson | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |
| Engineering and Design | Robert D. Sheridan | Endorses scope, design, conformance with design standards |
| Project Management | Timothy Moore | Endorses Resources, cost estimate, schedule |



Short Form Sanction Paper

6.1.2 Reviewers

Reviewers read the paper for content / language and recommends edits if necessary.

| Reviewer List | Name |
|--------------------------|----------------------|
| Finance | Keith Fowler |
| Regulatory | Gideon N. Katsh |
| Jurisdictional Delegates | Jennifer L. Grimsley |
| Procurement | Art Curran |

Short Form Sanction Paper



7. Decisions:

I:

(a) APPROVE this paper and the investment of \$1.653M and a tolerance of +/-10%

(b) NOTE that Danielle Phillips is the Project Manager and has the approved financial delegation.

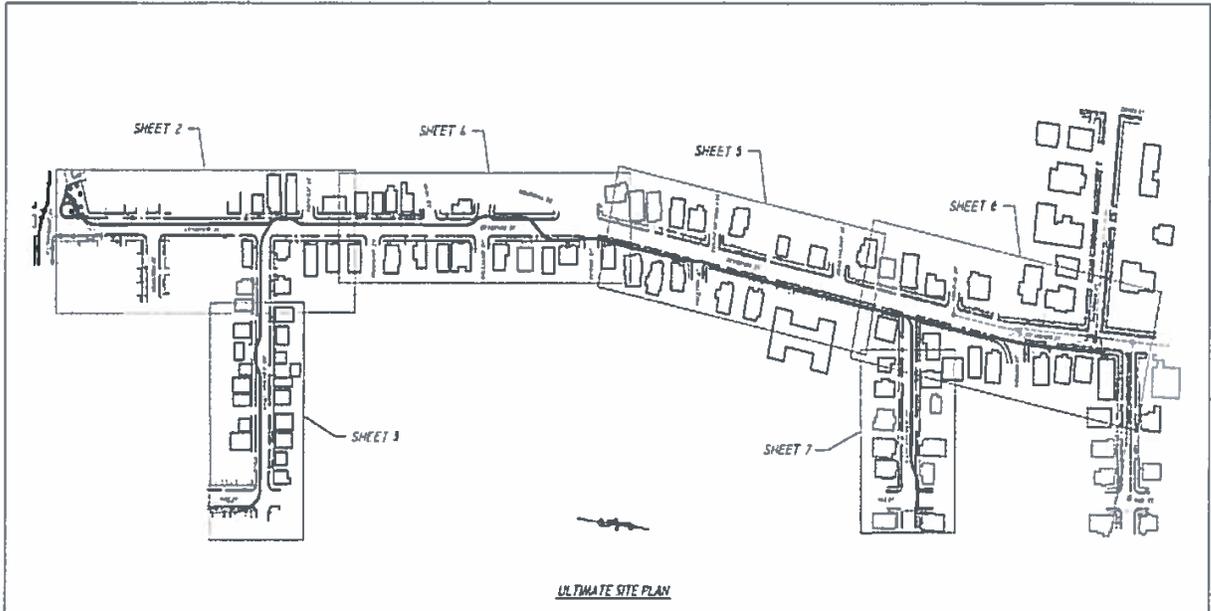
Signature..........Date..........

Marie Jordan
Senior Vice President
Network Strategy



Short Form Sanction Paper

8. Other Appendices:



C024175

Chase Hill Sub (D_Line)

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|---|--|
| Fund Project Number: <u>C024175</u> | USSC #: <u>USSC0408P36v7/AMICPW</u> |
| Revision: <u>11</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Chase Hill Sub (D Line)</u> | |
| Project Description: Distribution line work associated with a new 115:12.47 kV substation in Hopkinton, RI | |

| | |
|---|---|
| Project Status: <u>open</u> | |
| Responsible Person: <u>BOYLE, RICHARD</u> | Initiator: <u>Vaz, Jack P</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>36</u> | Project Complexity Score: <u>25</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|--|-----------------------|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>4/1/2008</u> | | Est Complete Date: <u>6/30/2019</u> | | | |
| Est In-Service Date: <u>3/31/2019</u> | | | | | |
| TTD Actuals: <u>\$4,582,824</u> | | As Of: <u>10/2/2017</u> | | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$7,602,000</u> | <u>\$0</u> | <u>\$0</u> | <u>\$7,602,000</u> | <u>\$0</u> |

Justification / Risk Identification:

Loading on four feeders and one transformer in the South County West area is projected to exceed SN capability and peak contingency loading on the two Westerly transformers and the Wood River T10 transformer is projected at 140% of SE capability. To address normal and contingency loading concerns in this area, the 2007 Annual Plan identified the need for a new substation in Hopkinton.

Project Scope:

Three new distribution feeders will be installed from the proposed substation with provision for a fourth feeder, when and if needed. The new feeders would primarily tie into and relieve the existing single feeder from the Ashaway Substation and other area feeders supplied out of Westerly substation. All load served by the new 115kV supplied Hopkinton substation would result in transfers from and relief of the area 34.5kV distribution supply system. Project #C24175 is expected to require the installation of 132 poles and approximately 5 circuit miles of 477 kcmil Al mainline conductors (approximately 100000 lbs).

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|----------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>12/21/2015 19:07:52</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C024175 Current Total Authorized Amount: \$7,600,000

Title

Project Number

| | |
|----------------------------|---------------------------------|
| Budget Version | Default (active) |
| Revision | v7 |
| Revision Status | Approved |
| Revision No. | <input type="text" value="11"/> |
| Est Start Date | 04/01/2008 |
| Est Complete Date | 06/30/2019 |
| Est In Srvc Date | 03/31/2019 |
| Capital | \$7,602,000.00 |
| Expense | \$0.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$0.00 |
| Total (excl. Rets.) | \$7,602,000.00 |
| Credits | \$0.00 |
| Net | \$7,602,000.00 |

Revision Info

Revision of 11

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for Critical Energy Infrastructure Information (CEII)

D+T



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|---------------------------------|
| Title: | Chase Hill Substation #155 | Sanction Paper #: | USSC0408P36v7 AMIC PWS0930v6 |
| Project #: | C024175, C024176, C030165, C030166, C034102, C036233, C036234 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 12/15/15 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | John Gavin, VP Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

- \$21.005M Capex*
- \$0.307M Opex*
- \$1.003M Removal*

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVAR 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|-----------------------|-----------------------|
| C024175 | D-Line | Chase Hill Substation | 7.602 |
| C024176 | D-Sub | Chase Hill Substation | 11.033 |
| C030165 | T-Line | Chase Hill Substation | 1.415 |
| C030166 | T-Sub | Chase Hill Substation | 1.815 |
| C034102 | D-Sub | Ashaway Retire | 0.200 |
| C036233 | D-Sub | Hope Valley Retire | 0.220 |
| C036234 | D-Line | Hope Valley Retire | 0.030 |
| Total | | | 22.315 |

1.4 Associated Projects

| Project Number | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------------|-----------------------|
| C036230 | Langworthy Substation (D-Sub) | 1.870 |
| C036232 | Langworthy Substation (D-Line) | 0.128 |
| Total | | 1.998 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Tolerance |
|----------|------------------------------------|-------------------|------------------------------|---------------------------------------|------------------|-----------|
| 6/10/15 | USSC0408P36v6 AMIC PWS0930v5 | \$8.610M | \$19.717M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 5-13-14 | USSC0408P36v5 AMIC PWS0930v4 | \$6.035M | \$19.72M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 12/11/13 | USSC0408P36v4 AMIC PWS0930v3 | \$4.035M | \$29.07M | Chase Hill Substation Project | Partial Sanction | +/-10% |
| 8/8/12 | USSC0408P36v3 AMIC PWS0930v2 | \$2.350M | \$23.216M | Hopkinton Substation Project | | +/-25% |
| 10/12/11 | USSC1011PS407 | \$1.300M | \$13.022M | Westerly Substation Flood Restoration | Partial Sanction | +/-25% |



US Sanction Paper

| | | | | | | |
|---------|---------------|----------|----------|--|----------------------------|--------|
| 1/4/09 | AMIC PWS0939 | \$0.350M | NA | New 115/13.2 Substation in Hopkinton, RI | PWS Re-Strategy | +/-10% |
| 1/11/09 | DCIG #0408P36 | \$0.960M | \$9.019M | Hopkinton New Substation Installation | RE-Strategy | +/-10% |
| 9/08 | AMIC #SG103 | \$0.133M | NA | Preliminary Engineering for New 115 kV Substation in Hopkinton, RI | Preliminary Works Sanction | +/-10% |
| 9/08 | AMIG #SG104 | \$0.133 | \$3.22M | Strategy to Build a 115 kV Substation in Hopkinton, RI | Strategy Paper | +/-10% |
| 4/10/08 | DCIG #0405P35 | \$0.250M | NA | Hopkinton New Substation Installation | Strategy Paper | NA |

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|----------------------------|
| 6/19 | Closure Paper |



US Sanction Paper

1.7 Category

| Category | Reference to Mandate, Policy, NPV, or Other |
|---|--|
| <input type="radio"/> Mandatory | The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. |
| <input checked="" type="radio"/> Policy- Driven | |
| <input type="radio"/> Justified NPV | |
| <input type="radio"/> Other | |

1.8 Asset Management Risk Score

Asset Management Risk Score: 36

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 25

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|---|---|--|--|
| NE Dist. FY'16 – FY'20 Approved Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$4.855M |
| NE Transmission FY'16 – FY'20 Business Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.098M |

1.12 If cost > approved Business Plan how will this be funded?

1.13 Current Planning Horizon

| \$M | Prior Yrs. | Current Planning Horizon | | | | | | Total |
|--------------------|------------|--------------------------|---------|---------|-----------|-----------|---------|--------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2015/16 | 2016/17 | 2017/18 | 2018/2019 | 2019/2020 | 0 | |
| CapEx | 3.197 | 3.110 | 10.910 | 2.282 | 2.281 | 0.020 | 0.000 | 21.800 |
| OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.150 | 0.000 | 0.168 |
| Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.300 | 0.000 | 0.347 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 3.197 | 3.110 | 10.975 | 2.282 | 2.281 | 0.470 | 0.000 | 22.315 |

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Start of Construction | September, 2015 |
| Project Sanction | December, 2015 |
| Station Construction Complete | September, 2016 |
| Ready for Load | December, 2016 |
| Complete D-Line Construction | September, 2018 |
| Removal/Retirements of Hope Valley & Ashaway Substations | March, 2019 |
| Project Closure | June, 2019 |



US Sanction Paper

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|----------------------------|
| 1 | Receipt of Building Permit |
| 2 | Winter Weather Conditions |
| 3 | |

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |



US Sanction Paper

1.18 List References

| | |
|---|---|
| 1 | Engineering Report – New Hopkinton Substation, Jan. 2008 |
| 2 | Transmission Planning Study – Proposed Hopkinton Substation, Sept. 2008 |
| 3 | Westerly Substation Flood Restoration – Sanction Paper |
| 4 | Technical Scope Document for Substations – Chase Hill #155, 7/31/13 |
| 5 | Technical Scope Document 115 kV Line 1870S/1814 Loop for Chase Hill |
| 6 | Project Change Request DOC #PR.09.04.00A |
| 7 | Project Data Sheet (PDS) #815-10, 3-30-15 |



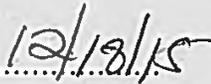
US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature  Date 

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

| | | | |
|---------------------------|---|--------------------------|---------------------------------------|
| Title: | Chase Hill Substation #155 | Sanction Paper #: | USSC0408P36v7 AMIC PWS0930v6 |
| Project #: | C024175, C024176, C030165, C030166, C034102, C036233, C036234 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 12/15/15 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | John Gavin, VP Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook |

3.1 Background

The South County West (SCW) area encompasses the Rhode Island towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. The SCW area has approximately 31,000 customers with a peak load of approximately 95MW. Six (6) substations supply the SCW area and combined supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

The Hopkinton Substation Project originally comprised of Funding Projects C24175, C24176, C30165, C30166, C33050 and C34102 was funded with an approved DOA of \$1.310M. This original project included a new 115-12.47kV substation in the town of Hopkinton, RI, directly tapped from the 115 kV Line 1870S on a parcel owned in fee by The Narragansett Electric Company (NEC). A single 115-12.47 kV, 24/32/40 MVA LTC transformer, a 7.2 MVAr 2-stage station capacitor bank at distribution voltage level, four (4) new distribution feeders were included as well as the retirement/removal of the Ashaway Substation.

Early investigations of the fee owned property for substation siting determined it to be zoned "residential" which would not permit substation construction. A zoning amendment petition submitted by NEC was subsequently denied and the Town of Hopkinton passed a new and more restrictive zoning ordinance for substations. NEC appealed to the RI PUC requesting an over-ride of the towns zoning ordinance. After several joint public meetings between the own, PUC and NG, the PUC issued an order requesting NG to investigate alternative town sites compliant with the new zoning ordinance. NG evaluated 20 potential zoning qualified sites, each of which had development issues from the town and/or NG perspectives. During this search, NG identified a parcel on Ashaway Rd. as a suitable substation site and although zoned



US Sanction Paper

residential was acceptable to the Town. A Town vote confirmed this approval and the two parties entered into a formal agreement.

During this siting effort a severe rainstorm/flood on March 30, 2010 resulted in the failure of the Westerly Substation in R.I. and a study of the effort was advanced. The study results indicated that in order to resolve the failure at Westerly Substation, the Hopkinton Substation would be fully built out (doubling its size), the Westerly Substation retired, and major improvements implemented at the Langworthy Substation in Westerly, R.I. A partial sanction for Hopkinton Substation Project was approved on 8/8/12 increasing the DOA funding from \$1.300M to \$2.350M to reflect this scope change and the substation given the formal name of "Chase Hill Substation #155".

On 12/11/13 a partial sanction was approved increasing the DOA from \$2.350M to \$4.035M for the advancement of the final design, wetland permit preparation, initiation of long lead equipment purchases and preliminary construction. Recently, a "Project Change Request" (Doc. #PR.09.04.00A) issued on 3/12/14 removed the Westerly work scope component from Chase Hill due to the distance to the load center which is reflected in this paper by \$9.3M cost reduction.

On 6/10/15 a partial sanction request of \$2.575M added to the previously approved \$6.035M brings the total DOA to \$8.610M with a tolerance of +/-10% for the overall Chase Hill #155 Substation Project. This request provided for the completion of design engineering, permitting, procurement of long lead equipment and preliminary construction activities.

3.2 Drivers

The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support the long term load growth in the area.

The South County West (SCW) area encompasses the Rhode Island Towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. Six (6) substations supply the SCW area. Combined, these substations supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

3.3 Project Description

The proposed Chase Hill Substation consists of constructing a new metal-clad substation on a newly acquired site on Ashaway Rd. in Hopkinton, R.I. The 115kV transmission circuit (1870S) Right-of-Way crosses through this property.



US Sanction Paper

The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-distribution feeder positions, and 7.2 MVar 2-stage station capacitor bank in the town of Hopkinton, R.I. The station directly tapped from the 115 kV Line 1870S will initially have four (4) distribution feeders to relieve the heavily loaded Ashaway Substation feeder and other area feeders, the other four feeder positions will be used to facilitate future expansion. Refer to Figure 4.2.4 for a Station One-Line Diagram.

With the energization of the Chase Hill Substation, the Ashaway and Hope Valley substations are no longer needed. The load will be transferred to the new Chase Hill Substation and they will be retired and dismantled.

3.4 *Benefits Summary*

The recommended alternative relieves the load and improves reliability issues in the Hopkinton area. The Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support long-term load growth. In addition, this recommendation will benefit customer reliability by converting the area from "Phasing Group 3" to "Phasing Group 2" which will facilitate feeder ties with the rest of the system in southern Rhode Island.

3.5 *Business and Customer Issues*

There are no significant business issues beyond what has been described elsewhere.

3.6 *Alternatives*

The recommended Option: Develop the Chase Hill Substation to meet the current and future loads of the Hopkinton area.

In 2008, a new substation project in Hopkinton, RI was approved by both AMIC and DCIG. The purpose of the project is to provide load relief to the heavily loaded local 34.5 kV sub-transmission system and allowed for the retirement of Ashaway Substation. The options considered at that time other than the recommended alternative provide herein would either defer the project or reinforce and expand the existing 34.5kV and 12.47kV distribution systems. This expansion would further require replacement of the Wood River transformers and upgrading the supply lines a much more costly alternative resulting in the selection of the Hopkinton project.



US Sanction Paper

3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the interconnection of the existing and newly installed feeders. This Plan will be developed during the Final Engineering and Design Phase.

Other required consents would include:

- Town Building Permit

There are environmental impacts associated with the construction of the substation. Specifically, a small stream crossing is required to accommodate the substation access road. To bridge this stream and minimize environmental impacts a pre-cast open bottom culvert is proposed to be installed. A vegetated buffer will be created between the substation and the nearby wetlands by planting native shrubs. This buffer will be extended in the final design to accommodate the Town's concerns to reduce the visual impact. Also, "Low Impact Development" techniques will be used to manage and improve the quality of the rain water runoff from the station's access driveway.

In addition, a noise study was conducted to determine the transformer to be specified for purchase so that the noise impact at the nearest abutter's residence is in an acceptable range. Finally, a Phase 1 Archeological Study was performed and approved. The report concluded that proposed substation in the area surveyed will have no effect on any significant cultural resources. However, during the site archeological survey, representatives of the Narragansett Indian Tribe Historical Preservation Office (NITHPO) observed a number of stone groupings within the central parcel area. These stone groupings have been identified and working in concert with the NITHPO, the substation facilities are laid out to avoid any interference with them.

US Sanction Paper



3.8 Execution Risk Appraisal



US Sanction Paper

| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Pre-Trigger Mitigation Plan | Residual Risk | Post Trigger Mitigation Plan |
|--------|---|-------------|--------|----------|-------|----------|----------|---|--|---|
| | | | Cost | Schedule | Cost | Schedule | | | | |
| 1 | Obtaining the required scheduled outage | 2 | 2 | 2 | | | Accept | Develop plan and increase communication between as scheduled outage approaches. | Construction delays may result from outage postponement. | Continue frequent communication until outage work is concluded. |
| 2 | Obtaining the proper distribution line easement rights or ability to enact existing rights. | 3 | 1 | 2 | | 6 | Mitigate | Identify dedicated individual to address potential property issues immediately after Distribution Line design is completed. | Unable to acquire proper easements. | Circle back to design to determine potential alternate routes. |
| 3 | Material/equipment damaged during substation construction extending schedule. | 1 | 2 | 2 | | | Mitigate | Require contractor to provide site security and be responsible for potential damage. | Vandalism occurs. | Enhance security measures and expedite replacement of materials and/or equipment. |
| 4 | Weather conditions requiring cancellation of construction work for one or more days. | 3 | 2 | 1 | | | Mitigate | Work with contractor to find an acceptable solution based on longer work day hours or weekends | Weather predictability | Retain flexibility in work hours |
| 5 | Long Eared Bat added to Endangered List | 1 | 1 | 1 | | | Mitigate | Work with Fish & Wildlife to define work parameters. | Yearly Restrictions | Strictly adhere to agency guidelines |
| 6 | Design based on incorrect as-builds, maps, t-sheets or other records | 2 | 2 | 1 | | | Mitigate | Provide multiple document reviews. | Correcting constructed facilities | Revise review procedure |

Total Risk \$: \$1M
Total Risk Wks: 8



US Sanction Paper

3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|-----------------|--|----------------------------|--|---------------------------|
| Building Permit | Certain | 1 mo. | Need Initiated | 1/16 |
| | | | | |
| | | | | |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to \$3.944M. This is indicative only. The actual revenue requirement will be recovered through Regional Network Service (RNS) rate base.

3.10.3 CIAC / Reimbursement - N/A



US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total |
|------------------------|-----------------------|----------------------------|-------------|-----------|--------------------------|---------|---------|-----------|-----------|---------|--------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | | | | 2015/16 | 2016/17 | 2017/18 | 2018/2019 | 2019/2020 | 0 | |
| C024175 | Chase Hill Substation | +/-10% | CapEx | 0.357 | 0.400 | 2.282 | 2.282 | 2.281 | 0.000 | 0.000 | 7.602 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.357 | 0.400 | 2.282 | 2.282 | 2.281 | 0.000 | 0.000 | 7.602 |
| C024176 | Chase Hill Substation | +/-10% | CapEx | 2.062 | 2.600 | 6.351 | 0.000 | 0.000 | 0.020 | 0.000 | 11.033 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 2.062 | 2.600 | 6.351 | 0.000 | 0.000 | 0.020 | 0.000 | 11.033 |
| C030165 | Chase Hill Substation | +/-10% | CapEx | 0.379 | 0.100 | 0.871 | 0.000 | 0.000 | 0.000 | 0.000 | 1.350 |
| | | | OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.000 | 0.000 | 0.018 |
| | | | Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.000 | 0.000 | 0.047 |
| | | | Total | 0.379 | 0.100 | 0.936 | 0.000 | 0.000 | 0.000 | 0.000 | 1.415 |
| C030166 | Chase Hill Substation | +/-10% | CapEx | 0.399 | 0.010 | 1.406 | 0.000 | 0.000 | 0.000 | 0.000 | 1.815 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.399 | 0.010 | 1.406 | 0.000 | 0.000 | 0.000 | 0.000 | 1.815 |
| C034102 | Ashaway Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 | 0.000 | 0.070 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.130 | 0.000 | 0.130 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.200 | 0.000 | 0.200 |
| C036233 | Hope Valley Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 | 0.000 | 0.070 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.150 | 0.000 | 0.150 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.220 | 0.000 | 0.220 |
| C036234 | Hope Valley Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.000 | 0.010 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.020 | 0.000 | 0.020 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.030 | 0.000 | 0.030 |
| Total Project Sanction | | | CapEx | 3.197 | 3.110 | 10.910 | 2.282 | 2.281 | 0.020 | 0.000 | 21.800 |
| | | | OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.150 | 0.000 | 0.168 |
| | | | Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.300 | 0.000 | 0.347 |
| | | | Total | 3.197 | 3.110 | 10.975 | 2.282 | 2.281 | 0.470 | 0.000 | 22.315 |



US Sanction Paper

3.11.2 Project Budget Summary Table

Distribution Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|---------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 4.173 | 5.522 | 5.800 | 0.000 | 0.000 | 0.000 | 0.000 | 15.495 |
| OpEx | 0.000 | 0.428 | 0.412 | 0.000 | 0.000 | 0.000 | 0.000 | 0.840 |
| Removal | 0.537 | 0.544 | 0.044 | 0.000 | 0.000 | 0.000 | 0.000 | 1.125 |
| Total Cost in Bus. Plan | 4.710 | 6.494 | 6.256 | 0.000 | 0.000 | 0.000 | 0.000 | 17.460 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|----------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 0.976 | 2.412 | (5.110) | (2.282) | (2.281) | (0.020) | 0.000 | (6.305) |
| OpEx | 0.000 | 0.428 | 0.394 | 0.000 | 0.000 | (0.150) | 0.000 | 0.672 |
| Removal | 0.537 | 0.544 | (0.003) | 0.000 | 0.000 | (0.300) | 0.000 | 0.778 |
| Total Cost in Bus. Plan | 1.513 | 3.384 | (4.719) | (2.282) | (2.281) | (0.470) | 0.000 | (4.855) |

Transmission Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|--------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 1.751 | 0.734 | 0.620 | 0.000 | 0.000 | 0.000 | 0.000 | 3.105 |
| OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total Cost in Bus. Plan | 1.751 | 0.734 | 0.620 | 0.000 | 0.000 | 0.000 | 0.000 | 3.105 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|----------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.624 | (1.657) | 0.000 | 0.000 | | 0.000 | (1.033) |
| OpEx | 0.000 | 0.000 | (0.018) | 0.000 | 0.000 | 0.000 | 0.000 | (0.018) |
| Removal | 0.000 | 0.000 | (0.047) | 0.000 | 0.000 | 0.000 | 0.000 | (0.047) |
| Total Cost in Bus. Plan | 0.000 | 0.624 | (1.722) | 0.000 | 0.000 | 0.000 | 0.000 | (1.098) |



US Sanction Paper

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

3.11.4.1 NPV Summary Table

| Economic measures | 5yr | 10yr | 20yr | Comment |
|--------------------------|-----|------|------|---------|
| NPV @ Discount rate | | | | |
| IRR | | | | |
| MIRR | | | | |
| Simple Payback in Years | | | | |
| Total O&M | | | | |
| Total Capital Investment | | | | |
| Total Savings | | | | |

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Area | Individual | Responsibility |
|--|---------------|--|
| Transmission NE | Michelle Park | Endorses relative to 5-year business plan or emergent work. |
| Dist. NE | Glen Diconza | Endorses relative to 5-year business plan or emergent work. |
| Distribution - New England | Anne Wyman | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |
| Trans. Line & Substation - New England | Mark Phillips | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |



US Sanction Paper

| | | |
|---|-------------------|---|
| Transmission Planning Projects | Kasia Kubacka | Endorses scope, design, conformance with design standards |
| Substations | Susan Martuscello | Endorses scope, design, conformance with design standards |
| Transmission & Sub-T Line | Mark Browne | Endorses scope, design, conformance with design standards |
| Protection & Telecom | Leonard Swanson | Endorses scope, design, conformance with design standards |
| Dist. Line and Sub. and Sub.-T Planning | Alan Labarre | Endorses scope, design, conformance with design standards |
| T&D Line NE | Andrew Schneller | Endorses resource, cost estimate and schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|-----------------------------|-----------------------------------|
| Finance | Keith Fowler and Phillip Horowitz |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegate | Carol Sedewitz |
| Jurisdictional Delegate | Jim Patterson |
| Procurement | Art Curran |
| New England Regional CC | Michael Gallagher |
| NE Transmission Regional CC | Will Houston |

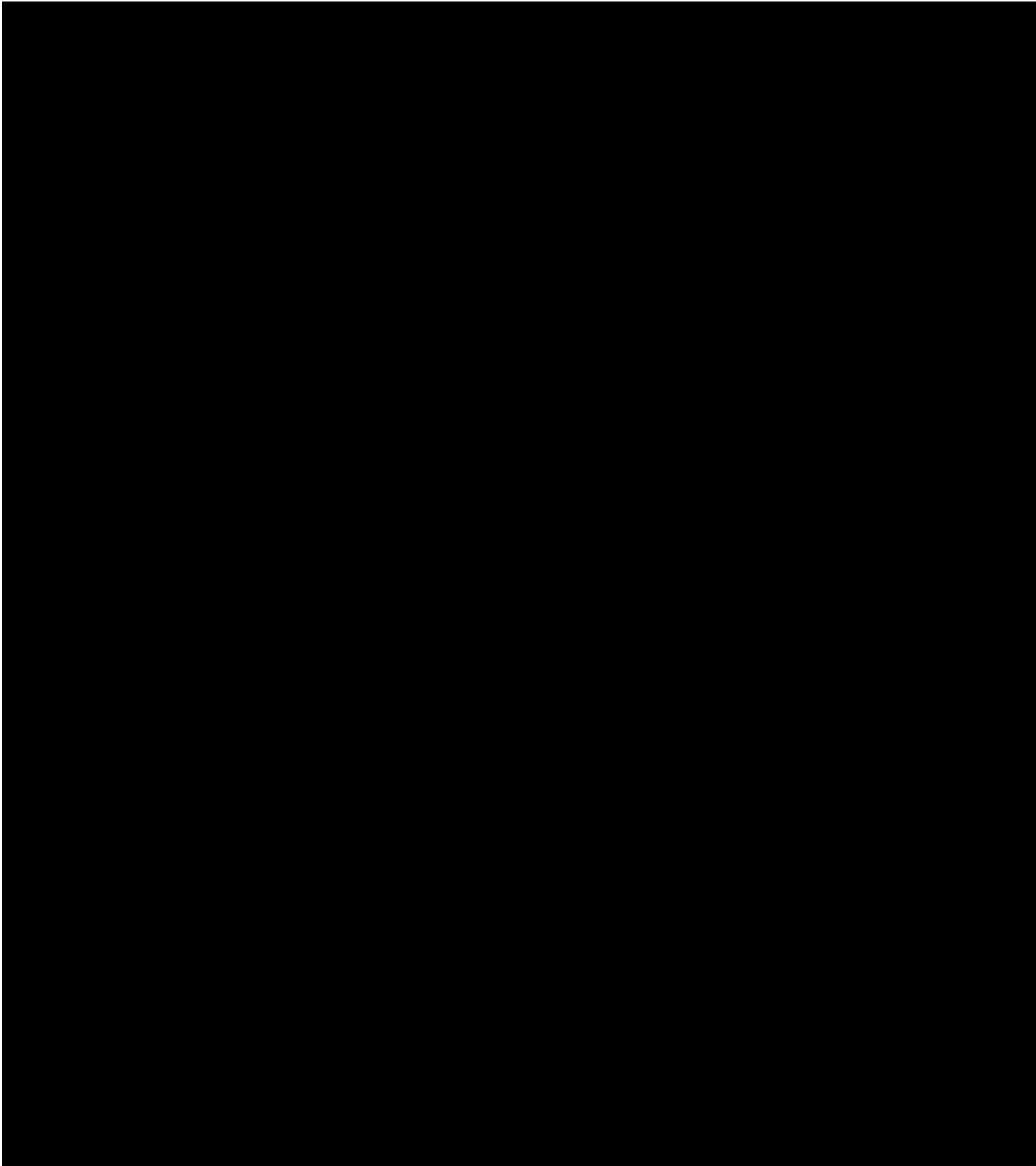
4 Appendices

4.1 Sanction Request Breakdown by Project - NA

US Sanction Paper



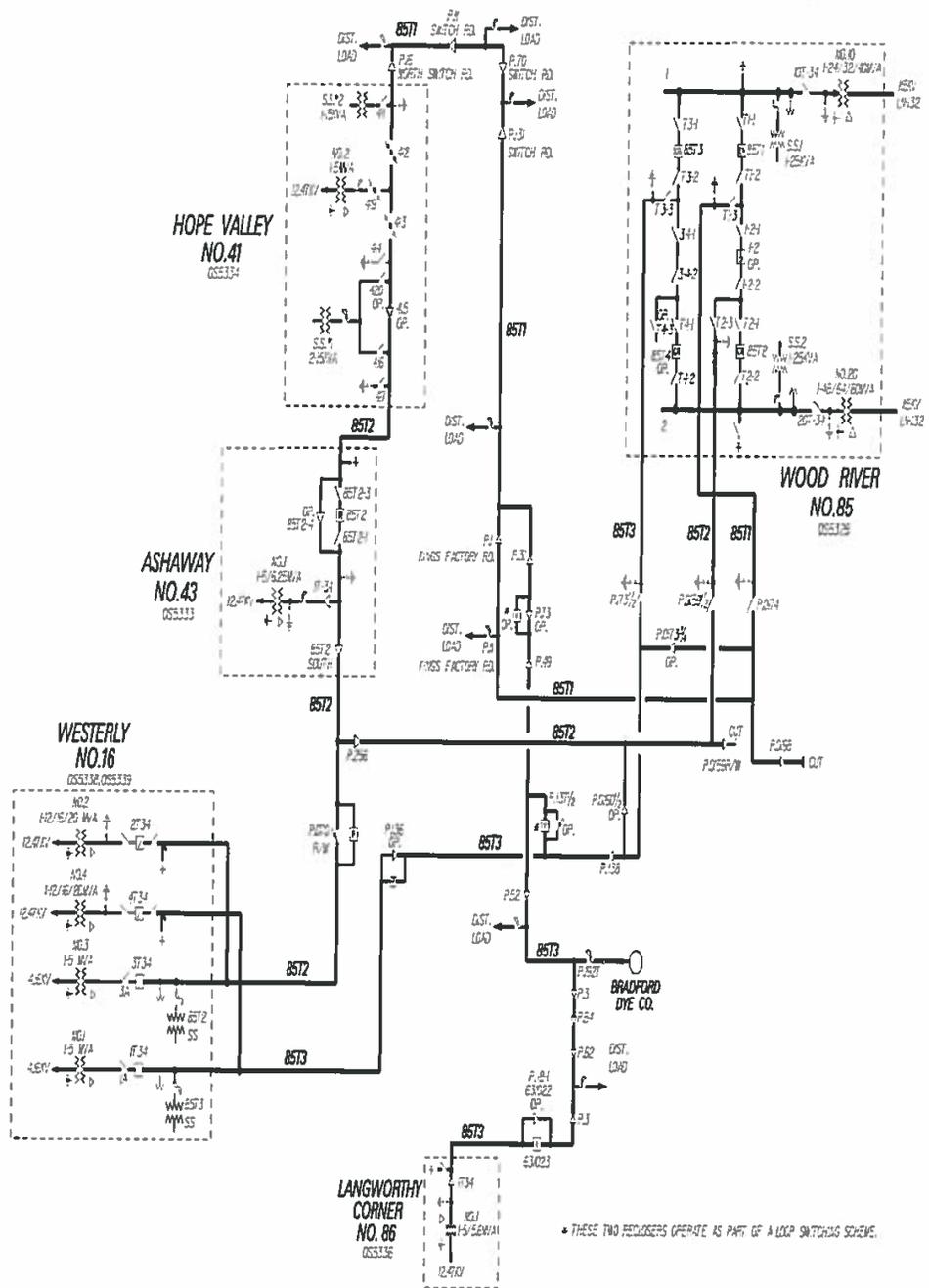
4.2 Other Appendices



US Sanction Paper



4.2.2 One Line Diagram: 34.5kV Lines 85T1, 85T2, & 85T3



34.5KV LINES 85T1, 85T2 & 85T3
OCEAN STATE DIVISION

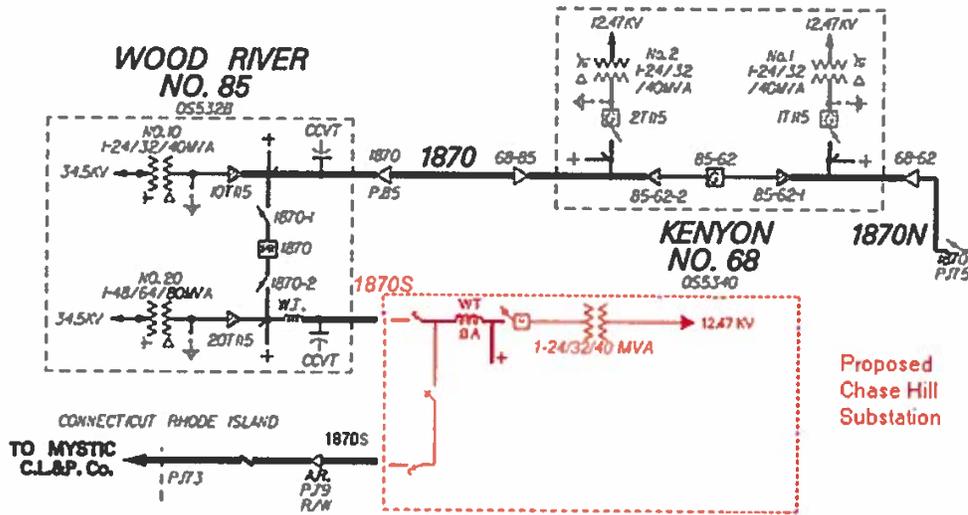
LND-3401

#0-08

US Sanction Paper



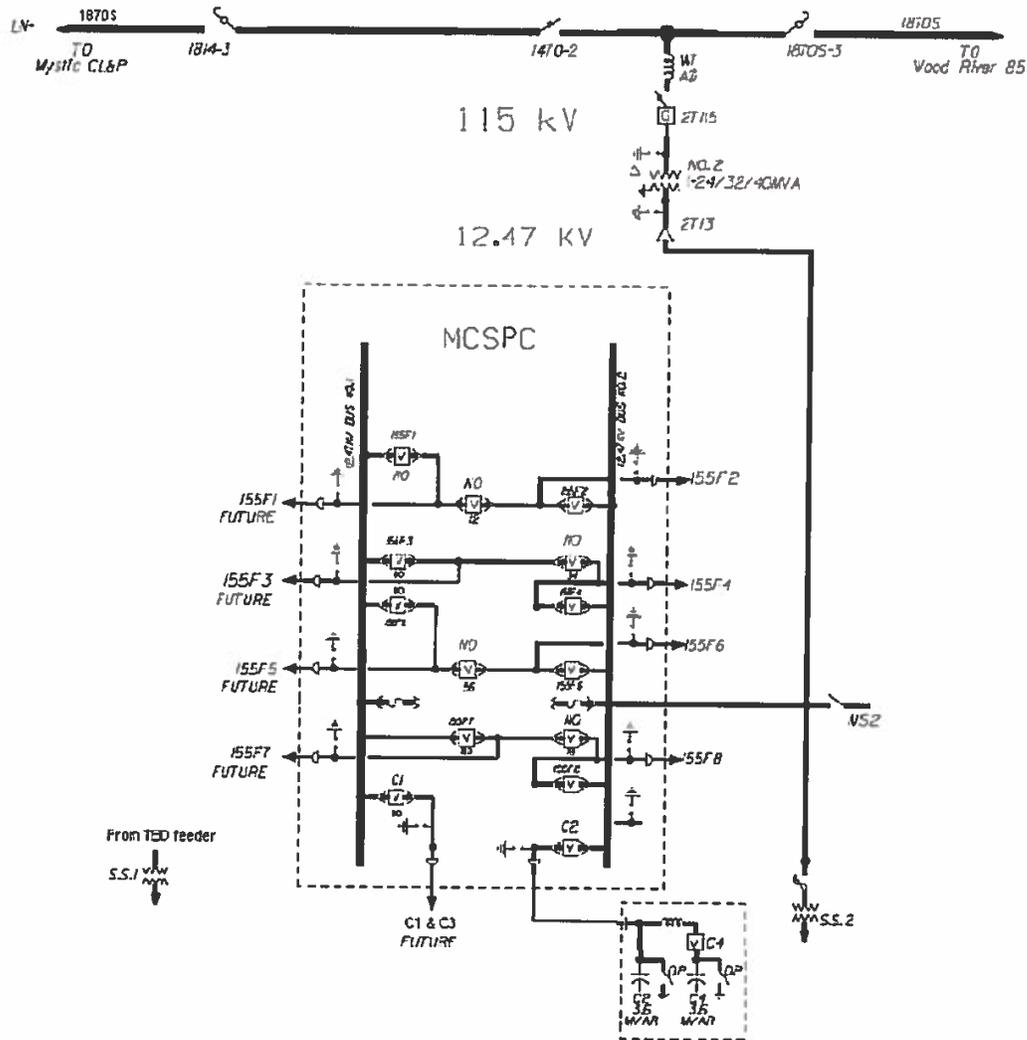
4.2.3 One Line Diagram with Chase Hill (Hope Valley & Ashaway Retirements):



US Sanction Paper



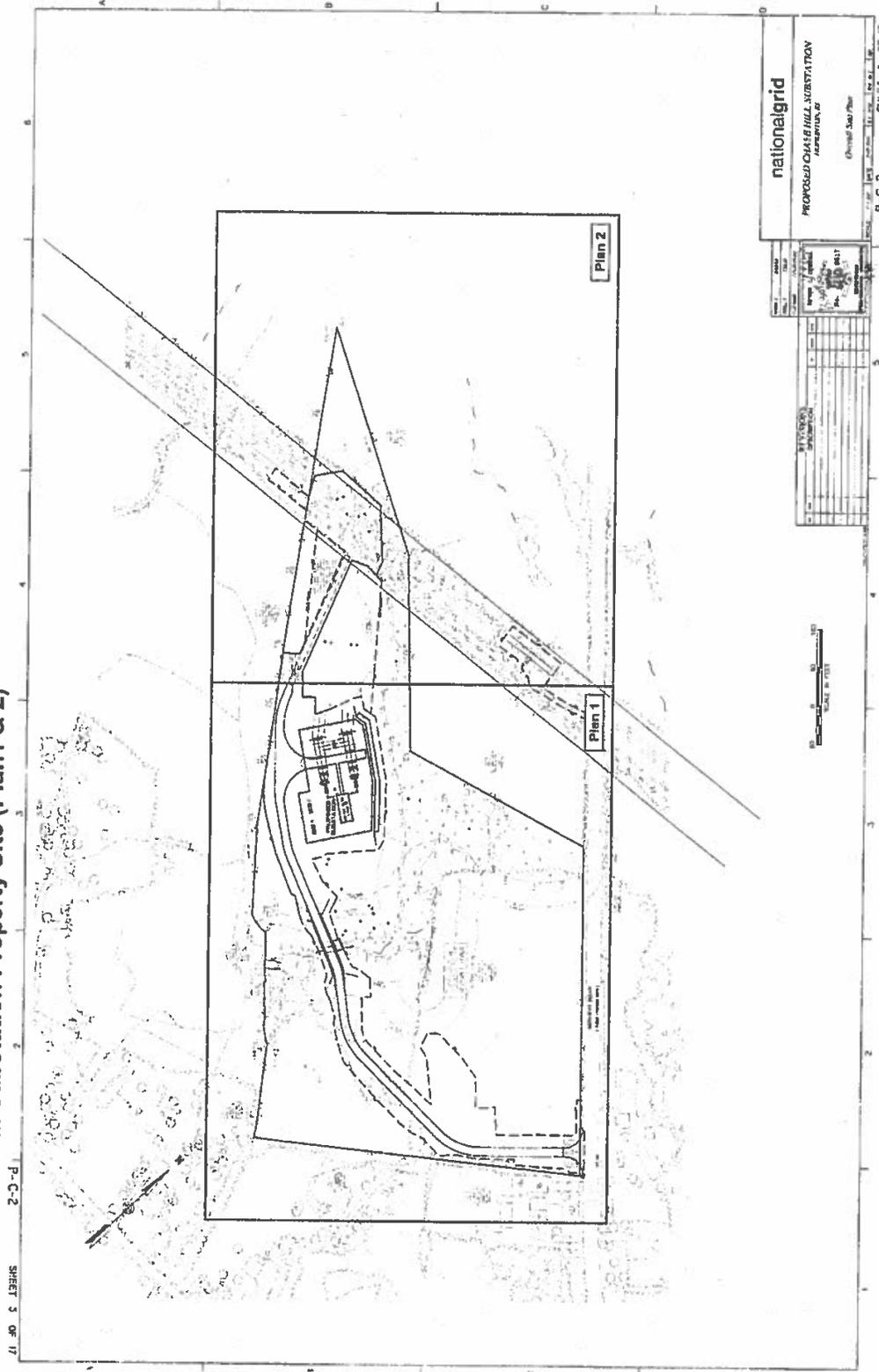
4.2.4 One Line Diagram: Chase Hill Substation One Line



nationalgrid

US Sanction Paper

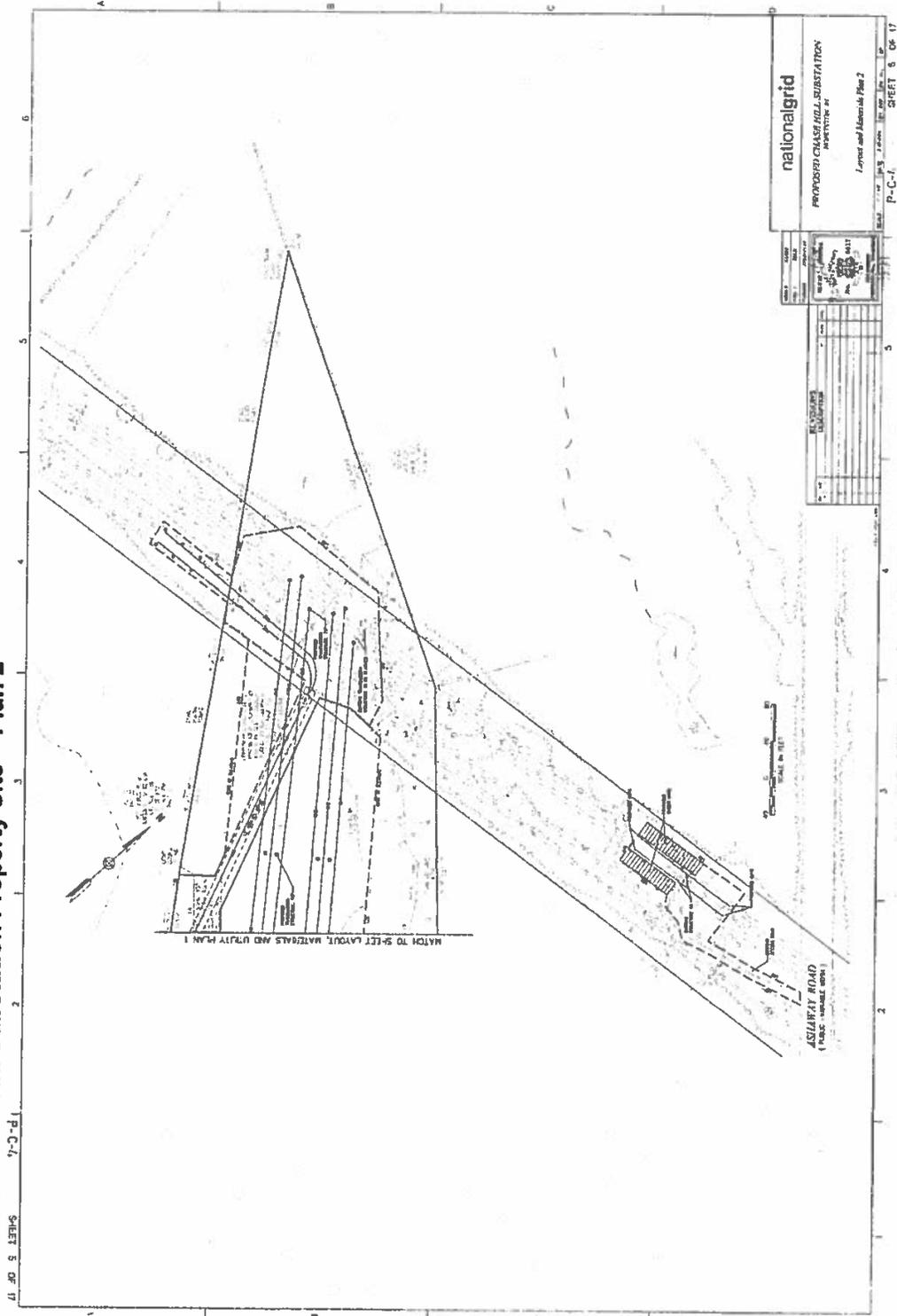
4.2.5 New Chase Hill Substation Property Site (Plan 1 & 2)



nationalgrid

US Sanction Paper

4.2.7 New Chase Hill Substation Property Site – Plan 2



US Sanction Paper



4.3 *NPV Summary - Not Applicable*

4.4 *Customer Outreach Plan*

A customer outreach effort was conducted on a limited scope prior to the Hopkinton Town meeting principally for the abutters of the proposed site of the substation. Project Status meetings with Town officials have been conducted monthly from construction start and will continue through the end of the Project.

D+T



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|---------------------------------------|
| Title: | Chase Hill Substation #155 | Sanction Paper #: | USSC0408P36v7 AMIC PWS0930v6 |
| Project #: | C024175, C024176, C030165, C030166, C034102, C036233, C036234 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 12/15/15 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | John Gavin, VP Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

- \$21.005M Capex*
- \$0.307M Opex*
- \$1.003M Removal*

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVA 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|-----------------------|-----------------------|
| C024175 | D-Line | Chase Hill Substation | 7.602 |
| C024176 | D-Sub | Chase Hill Substation | 11.033 |
| C030165 | T-Line | Chase Hill Substation | 1.415 |
| C030166 | T-Sub | Chase Hill Substation | 1.815 |
| C034102 | D-Sub | Ashaway Retire | 0.200 |
| C036233 | D-Sub | Hope Valley Retire | 0.220 |
| C036234 | D-Line | Hope Valley Retire | 0.030 |
| Total | | | 22.315 |

1.4 Associated Projects

| Project Number | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------------|-----------------------|
| C036230 | Langworthy Substation (D-Sub) | 1.870 |
| C036232 | Langworthy Substation (D-Line) | 0.128 |
| Total | | 1.998 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Tolerance |
|----------|------------------------------------|-------------------|------------------------------|---------------------------------------|------------------|-----------|
| 6/10/15 | USSC0408P36v6 AMIC PWS0930v5 | \$8.610M | \$19.717M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 5-13-14 | USSC0408P36v5 AMIC PWS0930v4 | \$6.035M | \$19.72M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 12/11/13 | USSC0408P36v4 AMIC PWS0930v3 | \$4.035M | \$29.07M | Chase Hill Substation Project | Partial Sanction | +/-10% |
| 8/8/12 | USSC0408P36v3 AMIC PWS0930v2 | \$2.350M | \$23.216M | Hopkinton Substation Project | | +/-25% |
| 10/12/11 | USSC1011PS407 | \$1.300M | \$13.022M | Westerly Substation Flood Restoration | Partial Sanction | +/-25% |

US Sanction Paper

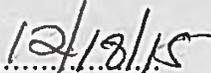


2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature  Date 

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

C024176

Chase Hill Sub (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|--|
| Fund Project Number: <u>C024176</u> | USSC #: <u>USSC0408P36v7/AMICPW</u> |
| Revision: <u>11</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Chase Hill Sub (D-Sub)</u> | |
| Project Description: New Hopkinton substation with 1-40MVA LTC transformer and 3-feeders. | |

| | |
|---|--|
| Project Status: <u>open</u> | |
| Responsible Person: <u>BOYLE, RICHARD</u> | Initiator: <u>Vaz, Jack P</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Sub RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>36</u> | Project Complexity Score: <u>25</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|-----------------------|--|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>4/1/2008</u> | | | Est Complete Date: <u>6/30/2019</u> | | |
| Est In-Service Date: <u>3/31/2019</u> | | | | | |
| TTD Actuals: <u>\$10,385,955</u> | | | As Of: <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$11,033,000</u> | <u>\$0</u> | <u>\$0</u> | <u>\$11,033,000</u> | <u>\$0</u> |

Justification / Risk Identification:

Loading on four feeders and one transformer in the South County West area is projected to exceed SN capability and peak contingency loading on the two Westerly transformers and the Wood River T10 transformer is projected at 140% of SE capability. To address normal and contingency loading concerns in this area, the 2007 Annual Plan identified the need for a new substation in Hopkinton.

Project Scope:

Permit, engineer and design a new 115-13.2kV substation on NGRID owned land off 115kV right of way in Hopkinton, RI. The substation equipment will consist of:

- A 115kV circuit switcher,
- A 115 & 13.2kV 24/32/40 MVA LTC transformer,
- A 5 feeders with metal clad switchgear, bus, & transformers and

Project Alternatives Considered:

<Enter data here>

Additional Notes:

PPM 3303 \$710K; PPM3304 \$1.235M; PPM11971 \$10K; PPM 11972 \$10K; PPM 11975 \$10K; PPM 3714 \$10K;
(Trans C30165 \$130K; C30166 \$235K)

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|----------------|-------------|----------------------------|-----------------|---------------|----------------------|
| Line 1: | Date | <u>12/21/2015 19:09:36</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C024176 Current Total Authorized Amount: \$11,0...

Title
Project Number

| | |
|---------------------------|---------------------------------|
| Budget Version | Default (active) |
| Revision | v7 |
| Revision Status | Approved |
| Revision No. | <input type="text" value="11"/> |
| Est Start Date | 04/01/2008 |
| Est Complete Date | 06/30/2019 |
| Est In Srvc Date | 03/31/2019 |
| Capital | \$11,033,000.00 |
| Expense | \$0.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$0.00 |
| Total (excl. Ret.) | \$11,033,000.00 |
| Credits | \$0.00 |
| Net | \$11,033,000.00 |

Revision Info

Revision of 11

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for Critical Energy Infrastructure Information (CEII)

DAT



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|---------------------------------|
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US Sanction Paper

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| C024176 | D-Sub | Chase Hill Substation | 11.033 |
| C030165 | T-Line | Chase Hill Substation | 1.415 |
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| C036232 | Langworthy Substation (D-Line) | 0.128 |
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| 10/12/11 | USSC1011PS407 | \$1.300M | \$13.022M | Westerly Substation Flood Restoration | Partial Sanction | +/-25% |



US Sanction Paper

| | | | | | | |
|---------|---------------|----------|----------|--|----------------------------|--------|
| 1/4/09 | AMIC PWS0939 | \$0.350M | NA | New 115/13.2 Substation in Hopkinton, RI | PWS Re-Strategy | +/-10% |
| 1/11/09 | DCIG #0408P36 | \$0.960M | \$9.019M | Hopkinton New Substation Installation | RE-Strategy | +/-10% |
| 9/08 | AMIC #SG103 | \$0.133M | NA | Preliminary Engineering for New 115 kV Substation in Hopkinton, RI | Preliminary Works Sanction | +/-10% |
| 9/08 | AMIG #SG104 | \$0.133 | \$3.22M | Strategy to Build a 115 kV Substation in Hopkinton, RI | Strategy Paper | +/-10% |
| 4/10/08 | DCIG #0405P35 | \$0.250M | NA | Hopkinton New Substation Installation | Strategy Paper | NA |

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|----------------------------|
| 6/19 | Closure Paper |



US Sanction Paper

1.7 Category

| Category | Reference to Mandate, Policy, NPV, or Other |
|---|--|
| <input type="radio"/> Mandatory | The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. |
| <input checked="" type="radio"/> Policy- Driven | |
| <input type="radio"/> Justified NPV | |
| <input type="radio"/> Other | |

1.8 Asset Management Risk Score

Asset Management Risk Score: 36

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 25

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|---|---|--|--|
| NE Dist. FY'16 – FY'20 Approved Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$4.855M |
| NE Transmission FY'16 – FY'20 Business Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.098M |

1.12 If cost > approved Business Plan how will this be funded?

1.13 Current Planning Horizon

| \$M | Prior Yrs. | Current Planning Horizon | | | | | | Total |
|--------------------|------------|--------------------------|---------|---------|-----------|-----------|---------|--------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2015/16 | 2016/17 | 2017/18 | 2018/2019 | 2019/2020 | 0 | |
| CapEx | 3.197 | 3.110 | 10.910 | 2.282 | 2.281 | 0.020 | 0.000 | 21.800 |
| OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.150 | 0.000 | 0.168 |
| Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.300 | 0.000 | 0.347 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 3.197 | 3.110 | 10.975 | 2.282 | 2.281 | 0.470 | 0.000 | 22.315 |

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Start of Construction | September, 2015 |
| Project Sanction | December, 2015 |
| Station Construction Complete | September, 2016 |
| Ready for Load | December, 2016 |
| Complete D-Line Construction | September, 2018 |
| Removal/Retirements of Hope Valley & Ashaway Substations | March, 2019 |
| Project Closure | June, 2019 |



US Sanction Paper

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|----------------------------|
| 1 | Receipt of Building Permit |
| 2 | Winter Weather Conditions |
| 3 | |

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |



US Sanction Paper

1.18 List References

| | |
|---|---|
| 1 | Engineering Report – New Hopkinton Substation, Jan. 2008 |
| 2 | Transmission Planning Study – Proposed Hopkinton Substation, Sept. 2008 |
| 3 | Westerly Substation Flood Restoration – Sanction Paper |
| 4 | Technical Scope Document for Substations – Chase Hill #155, 7/31/13 |
| 5 | Technical Scope Document 115 kV Line 1870S/1814 Loop for Chase Hill |
| 6 | Project Change Request DOC #PR.09.04.00A |
| 7 | Project Data Sheet (PDS) #815-10, 3-30-15 |



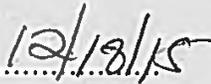
US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature  Date 

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

| | | | |
|---------------------------|---|--------------------------|---------------------------------------|
| Title: | Chase Hill Substation #155 | Sanction Paper #: | USSC0408P36v7 AMIC PWS0930v6 |
| Project #: | C024175, C024176, C030165, C030166, C034102, C036233, C036234 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 12/15/15 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | John Gavin, VP Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook |

3.1 Background

The South County West (SCW) area encompasses the Rhode Island towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. The SCW area has approximately 31,000 customers with a peak load of approximately 95MW. Six (6) substations supply the SCW area and combined supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

The Hopkinton Substation Project originally comprised of Funding Projects C24175, C24176, C30165, C30166, C33050 and C34102 was funded with an approved DOA of \$1.310M. This original project included a new 115-12.47kV substation in the town of Hopkinton, RI, directly tapped from the 115 kV Line 1870S on a parcel owned in fee by The Narragansett Electric Company (NEC). A single 115-12.47 kV, 24/32/40 MVA LTC transformer, a 7.2 MVAr 2-stage station capacitor bank at distribution voltage level, four (4) new distribution feeders were included as well as the retirement/removal of the Ashaway Substation.

Early investigations of the fee owned property for substation siting determined it to be zoned "residential" which would not permit substation construction. A zoning amendment petition submitted by NEC was subsequently denied and the Town of Hopkinton passed a new and more restrictive zoning ordinance for substations. NEC appealed to the RI PUC requesting an over-ride of the towns zoning ordinance. After several joint public meetings between the own, PUC and NG, the PUC issued an order requesting NG to investigate alternative town sites compliant with the new zoning ordinance. NG evaluated 20 potential zoning qualified sites, each of which had development issues from the town and/or NG perspectives. During this search, NG identified a parcel on Ashaway Rd. as a suitable substation site and although zoned



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residential was acceptable to the Town. A Town vote confirmed this approval and the two parties entered into a formal agreement.

During this siting effort a severe rainstorm/flood on March 30, 2010 resulted in the failure of the Westerly Substation in R.I. and a study of the effort was advanced. The study results indicated that in order to resolve the failure at Westerly Substation, the Hopkinton Substation would be fully built out (doubling its size), the Westerly Substation retired, and major improvements implemented at the Langworthy Substation in Westerly, R.I. A partial sanction for Hopkinton Substation Project was approved on 8/8/12 increasing the DOA funding from \$1.300M to \$2.350M to reflect this scope change and the substation given the formal name of "Chase Hill Substation #155".

On 12/11/13 a partial sanction was approved increasing the DOA from \$2.350M to \$4.035M for the advancement of the final design, wetland permit preparation, initiation of long lead equipment purchases and preliminary construction. Recently, a "Project Change Request" (Doc. #PR.09.04.00A) issued on 3/12/14 removed the Westerly work scope component from Chase Hill due to the distance to the load center which is reflected in this paper by \$9.3M cost reduction.

On 6/10/15 a partial sanction request of \$2.575M added to the previously approved \$6.035M brings the total DOA to \$8.610M with a tolerance of +/-10% for the overall Chase Hill #155 Substation Project. This request provided for the completion of design engineering, permitting, procurement of long lead equipment and preliminary construction activities.

3.2 Drivers

The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support the long term load growth in the area.

The South County West (SCW) area encompasses the Rhode Island Towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. Six (6) substations supply the SCW area. Combined, these substations supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

3.3 Project Description

The proposed Chase Hill Substation consists of constructing a new metal-clad substation on a newly acquired site on Ashaway Rd. in Hopkinton, R.I. The 115kV transmission circuit (1870S) Right-of-Way crosses through this property.



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The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-distribution feeder positions, and 7.2 MVar 2-stage station capacitor bank in the town of Hopkinton, R.I. The station directly tapped from the 115 kV Line 1870S will initially have four (4) distribution feeders to relieve the heavily loaded Ashaway Substation feeder and other area feeders, the other four feeder positions will be used to facilitate future expansion. Refer to Figure 4.2.4 for a Station One-Line Diagram.

With the energization of the Chase Hill Substation, the Ashaway and Hope Valley substations are no longer needed. The load will be transferred to the new Chase Hill Substation and they will be retired and dismantled.

3.4 *Benefits Summary*

The recommended alternative relieves the load and improves reliability issues in the Hopkinton area. The Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support long-term load growth. In addition, this recommendation will benefit customer reliability by converting the area from "Phasing Group 3" to "Phasing Group 2" which will facilitate feeder ties with the rest of the system in southern Rhode Island.

3.5 *Business and Customer Issues*

There are no significant business issues beyond what has been described elsewhere.

3.6 *Alternatives*

The recommended Option: Develop the Chase Hill Substation to meet the current and future loads of the Hopkinton area.

In 2008, a new substation project in Hopkinton, RI was approved by both AMIC and DCIG. The purpose of the project is to provide load relief to the heavily loaded local 34.5 kV sub-transmission system and allowed for the retirement of Ashaway Substation. The options considered at that time other than the recommended alternative provide herein would either defer the project or reinforce and expand the existing 34.5kV and 12.47kV distribution systems. This expansion would further require replacement of the Wood River transformers and upgrading the supply lines a much more costly alternative resulting in the selection of the Hopkinton project.



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3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the interconnection of the existing and newly installed feeders. This Plan will be developed during the Final Engineering and Design Phase.

Other required consents would include:

- Town Building Permit

There are environmental impacts associated with the construction of the substation. Specifically, a small stream crossing is required to accommodate the substation access road. To bridge this stream and minimize environmental impacts a pre-cast open bottom culvert is proposed to be installed. A vegetated buffer will be created between the substation and the nearby wetlands by planting native shrubs. This buffer will be extended in the final design to accommodate the Town's concerns to reduce the visual impact. Also, "Low Impact Development" techniques will be used to manage and improve the quality of the rain water runoff from the station's access driveway.

In addition, a noise study was conducted to determine the transformer to be specified for purchase so that the noise impact at the nearest abutter's residence is in an acceptable range. Finally, a Phase 1 Archeological Study was performed and approved. The report concluded that proposed substation in the area surveyed will have no effect on any significant cultural resources. However, during the site archeological survey, representatives of the Narragansett Indian Tribe Historical Preservation Office (NITHPO) observed a number of stone groupings within the central parcel area. These stone groupings have been identified and working in concert with the NITHPO, the substation facilities are laid out to avoid any interference with them.

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3.8 *Execution Risk Appraisal*



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| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Pre-Trigger Mitigation Plan | Residual Risk | Post Trigger Mitigation Plan |
|--------|---|-------------|--------|----------|-------|----------|----------|---|--|---|
| | | | Cost | Schedule | Cost | Schedule | | | | |
| 1 | Obtaining the required scheduled outage | 2 | 2 | 2 | | | Accept | Develop plan and increase communication between as scheduled outage approaches. | Construction delays may result from outage postponement. | Continue frequent communication until outage work is concluded. |
| 2 | Obtaining the proper distribution line easement rights or ability to enact existing rights. | 3 | 1 | 2 | | 6 | Mitigate | Identify dedicated individual to address potential property issues immediately after Distribution Line design is completed. | Unable to acquire proper easements. | Circle back to design to determine potential alternate routes. |
| 3 | Material/equipment damaged during substation construction extending schedule. | 1 | 2 | 2 | | | Mitigate | Require contractor to provide site security and be responsible for potential damage. | Vandalism occurs. | Enhance security measures and expedite replacement of materials and/or equipment. |
| 4 | Weather conditions requiring cancellation of construction work for one or more days. | 3 | 2 | 1 | | | Mitigate | Work with contractor to find an acceptable solution based on longer work day hours or weekends | Weather predictability | Retain flexibility in work hours |
| 5 | Long Eared Bat added to Endangered List | 1 | 1 | 1 | | | Mitigate | Work with Fish & Wildlife to define work parameters. | Yearly Restrictions | Strictly adhere to agency guidelines |
| 6 | Design based on incorrect as-builds, maps, t-sheets or other records | 2 | 2 | 1 | | | Mitigate | Provide multiple document reviews. | Correcting constructed facilities | Revise review procedure |

Total Risk \$: \$1M
Total Risk Wks: 8



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3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|-----------------|--|----------------------------|--|---------------------------|
| Building Permit | Certain | 1 mo. | Need Initiated | 1/16 |
| | | | | |
| | | | | |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to \$3.944M. This is indicative only. The actual revenue requirement will be recovered through Regional Network Service (RNS) rate base.

3.10.3 CIAC / Reimbursement - N/A



US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total |
|------------------------|-----------------------|----------------------------|-------------|-----------|--------------------------|---------|---------|-----------|-----------|---------|--------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | | | | 2015/16 | 2016/17 | 2017/18 | 2018/2019 | 2019/2020 | 0 | |
| C024175 | Chase Hill Substation | +/-10% | CapEx | 0.357 | 0.400 | 2.282 | 2.282 | 2.281 | 0.000 | 0.000 | 7.602 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.357 | 0.400 | 2.282 | 2.282 | 2.281 | 0.000 | 0.000 | 7.602 |
| C024176 | Chase Hill Substation | +/-10% | CapEx | 2.062 | 2.600 | 6.351 | 0.000 | 0.000 | 0.020 | 0.000 | 11.033 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 2.062 | 2.600 | 6.351 | 0.000 | 0.000 | 0.020 | 0.000 | 11.033 |
| C030165 | Chase Hill Substation | +/-10% | CapEx | 0.379 | 0.100 | 0.871 | 0.000 | 0.000 | 0.000 | 0.000 | 1.350 |
| | | | OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.000 | 0.000 | 0.018 |
| | | | Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.000 | 0.000 | 0.047 |
| | | | Total | 0.379 | 0.100 | 0.936 | 0.000 | 0.000 | 0.000 | 0.000 | 1.415 |
| C030166 | Chase Hill Substation | +/-10% | CapEx | 0.399 | 0.010 | 1.406 | 0.000 | 0.000 | 0.000 | 0.000 | 1.815 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.399 | 0.010 | 1.406 | 0.000 | 0.000 | 0.000 | 0.000 | 1.815 |
| C034102 | Ashaway Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 | 0.000 | 0.070 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.130 | 0.000 | 0.130 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.200 | 0.000 | 0.200 |
| C036233 | Hope Valley Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 | 0.000 | 0.070 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.150 | 0.000 | 0.150 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.220 | 0.000 | 0.220 |
| C036234 | Hope Valley Retire | +/-10% | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.000 | 0.010 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.020 | 0.000 | 0.020 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.030 | 0.000 | 0.030 |
| Total Project Sanction | | | CapEx | 3.197 | 3.110 | 10.910 | 2.282 | 2.281 | 0.020 | 0.000 | 21.800 |
| | | | OpEx | 0.000 | 0.000 | 0.018 | 0.000 | 0.000 | 0.150 | 0.000 | 0.168 |
| | | | Removal | 0.000 | 0.000 | 0.047 | 0.000 | 0.000 | 0.300 | 0.000 | 0.347 |
| | | | Total | 3.197 | 3.110 | 10.975 | 2.282 | 2.281 | 0.470 | 0.000 | 22.315 |



US Sanction Paper

3.11.2 Project Budget Summary Table

Distribution Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|---------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 4.173 | 5.522 | 5.800 | 0.000 | 0.000 | 0.000 | 0.000 | 15.495 |
| OpEx | 0.000 | 0.428 | 0.412 | 0.000 | 0.000 | 0.000 | 0.000 | 0.840 |
| Removal | 0.537 | 0.544 | 0.044 | 0.000 | 0.000 | 0.000 | 0.000 | 1.125 |
| Total Cost in Bus. Plan | 4.710 | 6.494 | 6.256 | 0.000 | 0.000 | 0.000 | 0.000 | 17.460 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|----------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 0.976 | 2.412 | (5.110) | (2.282) | (2.281) | (0.020) | 0.000 | (6.305) |
| OpEx | 0.000 | 0.428 | 0.394 | 0.000 | 0.000 | (0.150) | 0.000 | 0.672 |
| Removal | 0.537 | 0.544 | (0.003) | 0.000 | 0.000 | (0.300) | 0.000 | 0.778 |
| Total Cost in Bus. Plan | 1.513 | 3.384 | (4.719) | (2.282) | (2.281) | (0.470) | 0.000 | (4.855) |

Transmission Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|--------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 1.751 | 0.734 | 0.620 | 0.000 | 0.000 | 0.000 | 0.000 | 3.105 |
| OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total Cost in Bus. Plan | 1.751 | 0.734 | 0.620 | 0.000 | 0.000 | 0.000 | 0.000 | 3.105 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|--------------------|--------------------|--------------|----------------|
| | | Yr. 1 2015/16 | Yr. 2 2016/17 | Yr. 3 2017/18 | Yr. 4 2018/2019 | Yr. 5 2019/2020 | Yr. 6 + 0 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.624 | (1.657) | 0.000 | 0.000 | | 0.000 | (1.033) |
| OpEx | 0.000 | 0.000 | (0.018) | 0.000 | 0.000 | 0.000 | 0.000 | (0.018) |
| Removal | 0.000 | 0.000 | (0.047) | 0.000 | 0.000 | 0.000 | 0.000 | (0.047) |
| Total Cost in Bus. Plan | 0.000 | 0.624 | (1.722) | 0.000 | 0.000 | 0.000 | 0.000 | (1.098) |



US Sanction Paper

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

3.11.4.1 NPV Summary Table

| Economic measures | 5yr | 10yr | 20yr | Comment |
|--------------------------|-----|------|------|---------|
| NPV @ Discount rate | | | | |
| IRR | | | | |
| MIRR | | | | |
| Simple Payback in Years | | | | |
| Total O&M | | | | |
| Total Capital Investment | | | | |
| Total Savings | | | | |

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Area | Individual | Responsibility |
|--|---------------|--|
| Transmission NE | Michelle Park | Endorses relative to 5-year business plan or emergent work. |
| Dist. NE | Glen Diconza | Endorses relative to 5-year business plan or emergent work. |
| Distribution - New England | Anne Wyman | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |
| Trans. Line & Substation - New England | Mark Phillips | Endorses Resources, cost estimate, schedule, and Portfolio Alignment |



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| | | |
|---|-------------------|---|
| Transmission Planning Projects | Kasia Kubacka | Endorses scope, design, conformance with design standards |
| Substations | Susan Martuscello | Endorses scope, design, conformance with design standards |
| Transmission & Sub-T Line | Mark Browne | Endorses scope, design, conformance with design standards |
| Protection & Telecom | Leonard Swanson | Endorses scope, design, conformance with design standards |
| Dist. Line and Sub. and Sub.-T Planning | Alan Labarre | Endorses scope, design, conformance with design standards |
| T&D Line NE | Andrew Schneller | Endorses resource, cost estimate and schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|-----------------------------|-----------------------------------|
| Finance | Keith Fowler and Phillip Horowitz |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegate | Carol Sedewitz |
| Jurisdictional Delegate | Jim Patterson |
| Procurement | Art Curran |
| New England Regional CC | Michael Gallagher |
| NE Transmission Regional CC | Will Houston |

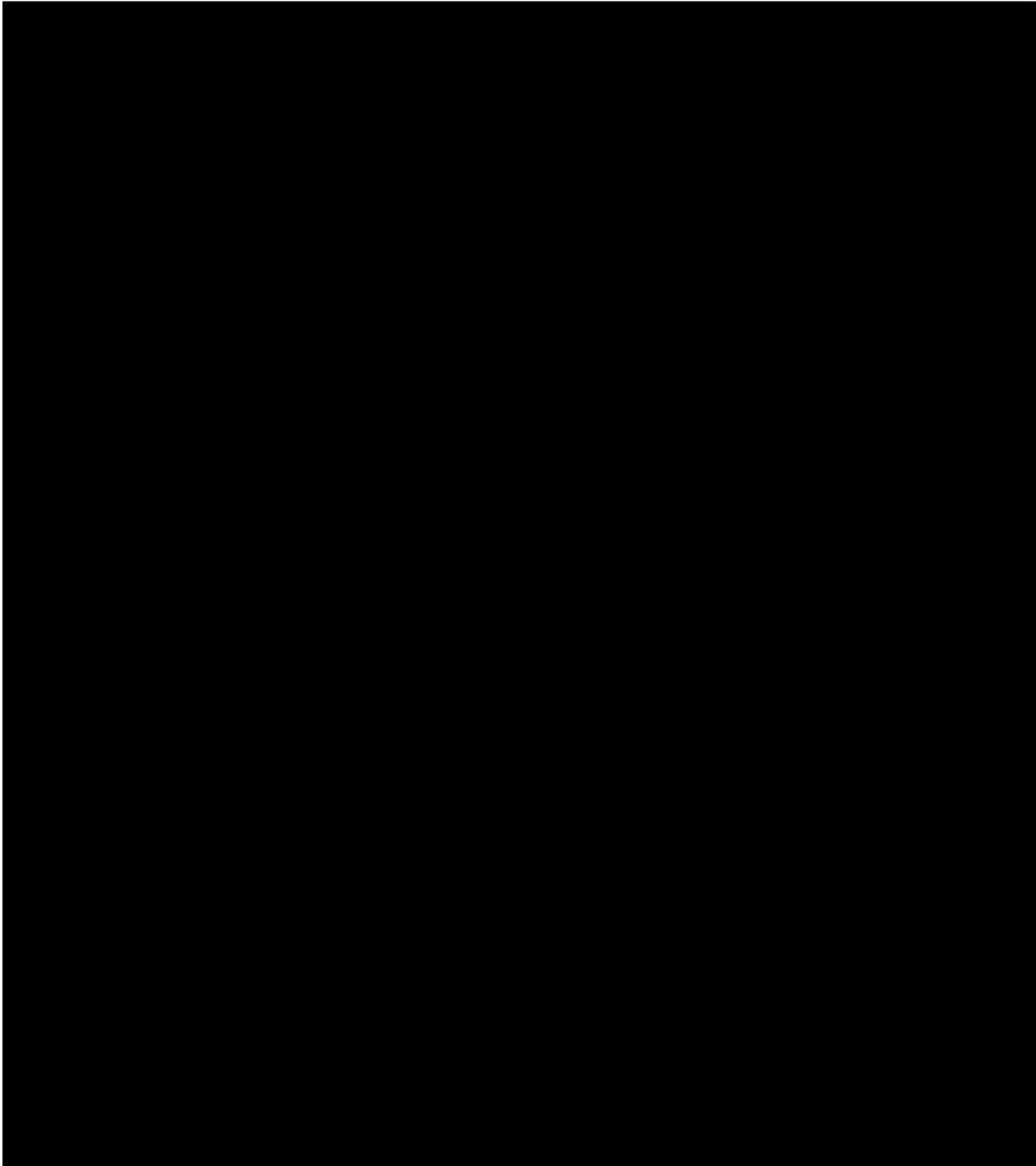
4 Appendices

4.1 Sanction Request Breakdown by Project - NA

US Sanction Paper



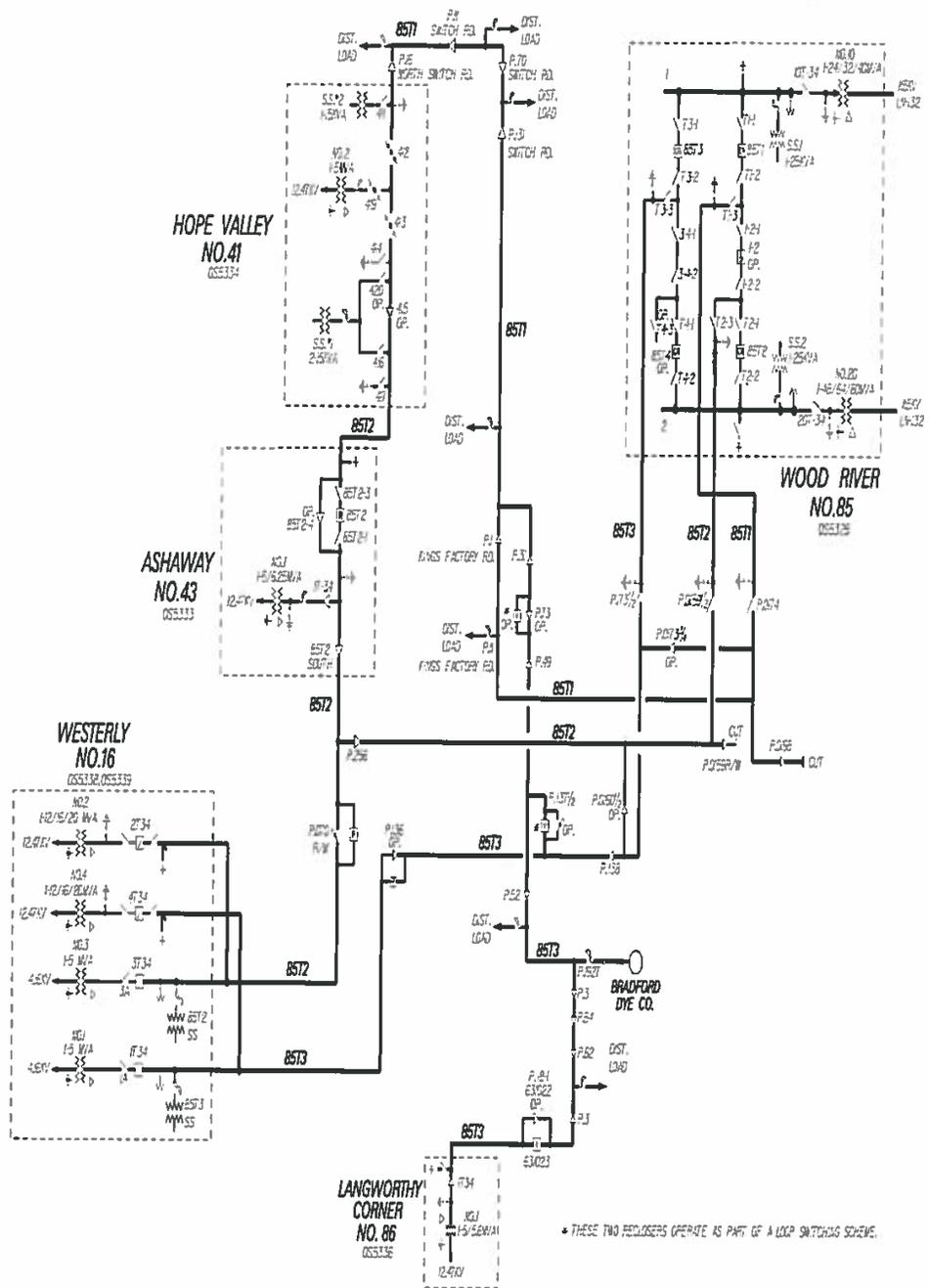
4.2 Other Appendices



US Sanction Paper



4.2.2 One Line Diagram: 34.5kV Lines 85T1, 85T2, & 5T3



34.5KV LINES 85T1, 85T2 & 85T3
OCEAN STATE DIVISION

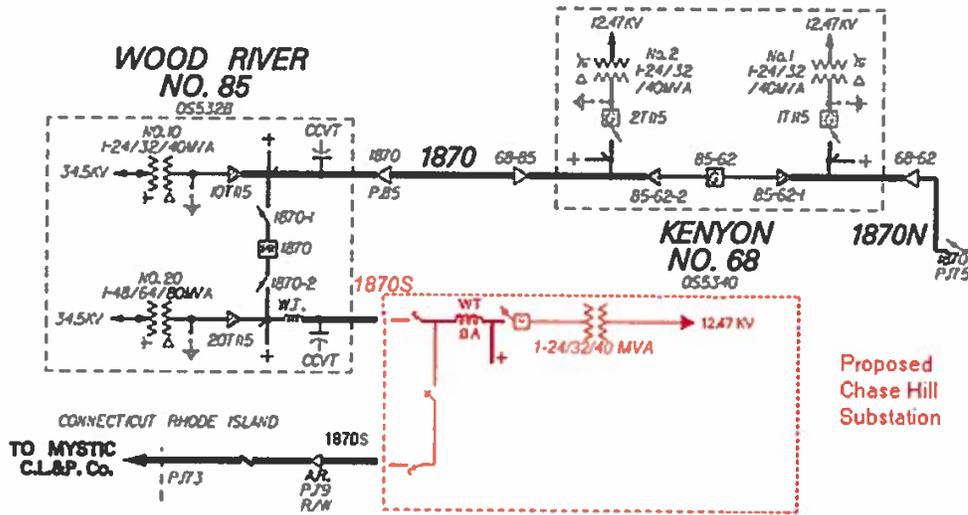
LND-3401

#0-08

US Sanction Paper



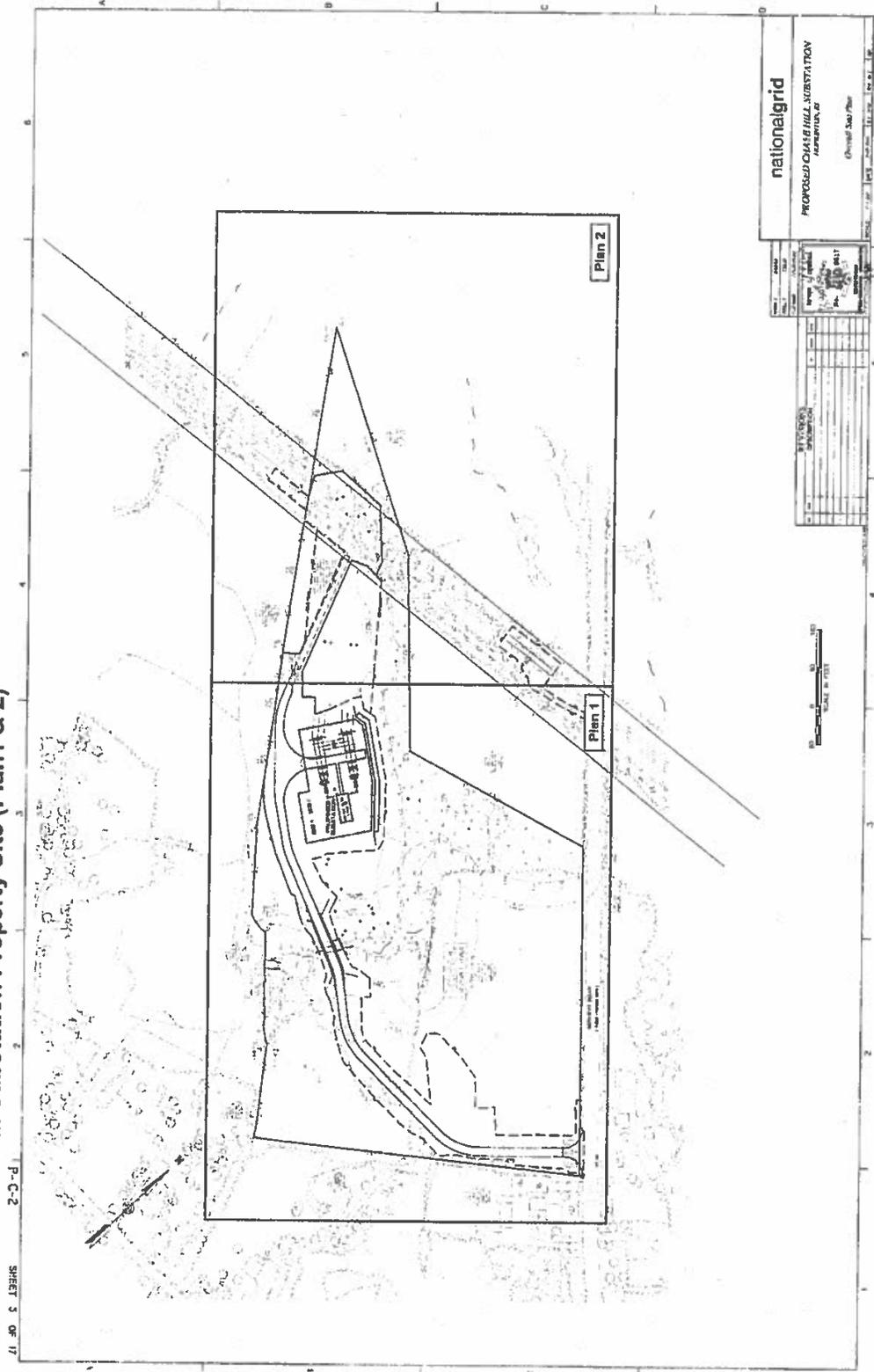
4.2.3 One Line Diagram with Chase Hill (Hope Valley & Ashaway Retirements):



nationalgrid

US Sanction Paper

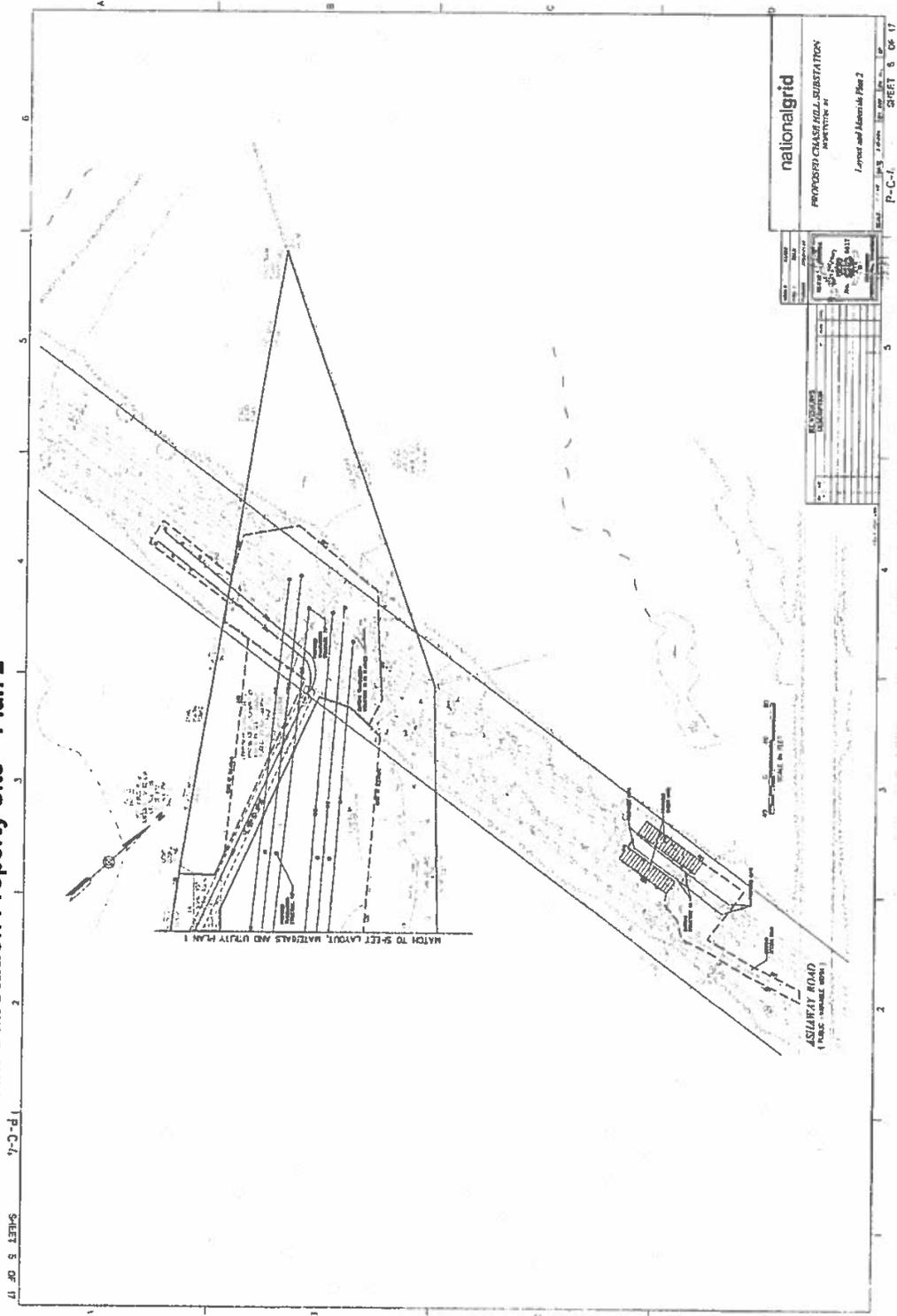
4.2.5 New Chase Hill Substation Property Site (Plan 1 & 2)



nationalgrid

US Sanction Paper

4.2.7 New Chase Hill Substation Property Site – Plan 2



US Sanction Paper



4.3 *NPV Summary - Not Applicable*

4.4 *Customer Outreach Plan*

A customer outreach effort was conducted on a limited scope prior to the Hopkinton Town meeting principally for the abutters of the proposed site of the substation. Project Status meetings with Town officials have been conducted monthly from construction start and will continue through the end of the Project.

D+T



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|---------------------------------------|
| Title: | Chase Hill Substation #155 | Sanction Paper #: | USSC0408P36v7 AMIC PWS0930v6 |
| Project #: | C024175, C024176, C030165, C030166, C034102, C036233, C036234 | Sanction Type: | Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 12/15/15 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | John Gavin, VP Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

- \$21.005M Capex*
- \$0.307M Opex*
- \$1.003M Removal*

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVA 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|-----------------------|-----------------------|
| C024175 | D-Line | Chase Hill Substation | 7.602 |
| C024176 | D-Sub | Chase Hill Substation | 11.033 |
| C030165 | T-Line | Chase Hill Substation | 1.415 |
| C030166 | T-Sub | Chase Hill Substation | 1.815 |
| C034102 | D-Sub | Ashaway Retire | 0.200 |
| C036233 | D-Sub | Hope Valley Retire | 0.220 |
| C036234 | D-Line | Hope Valley Retire | 0.030 |
| Total | | | 22.315 |

1.4 Associated Projects

| Project Number | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------------|-----------------------|
| C036230 | Langworthy Substation (D-Sub) | 1.870 |
| C036232 | Langworthy Substation (D-Line) | 0.128 |
| Total | | 1.998 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Tolerance |
|----------|------------------------------------|-------------------|------------------------------|---------------------------------------|------------------|-----------|
| 6/10/15 | USSC0408P36v6 AMIC PWS0930v5 | \$8.610M | \$19.717M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 5-13-14 | USSC0408P36v5 AMIC PWS0930v4 | \$6.035M | \$19.72M | Chase Hill Substation #155 | Partial Sanction | +/-10% |
| 12/11/13 | USSC0408P36v4 AMIC PWS0930v3 | \$4.035M | \$29.07M | Chase Hill Substation Project | Partial Sanction | +/-10% |
| 8/8/12 | USSC0408P36v3 AMIC PWS0930v2 | \$2.350M | \$23.216M | Hopkinton Substation Project | | +/-25% |
| 10/12/11 | USSC1011PS407 | \$1.300M | \$13.022M | Westerly Substation Flood Restoration | Partial Sanction | +/-25% |

US Sanction Paper

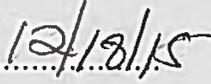


2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature  Date 

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

C024179

Coventry MITS (Dist Sub)

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

| | | | |
|----------------|---------------------------------------|-------------------------------|----------------------|
| Line 1: | Date <u>5/24/2016 13:11:08</u> | Approver <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | Approver | |
| Line 3: | Date | Approver | |
| Line 4: | Date | Approver | |
| Line 5: | Date | Approver | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPPlan Help Calc Print Win

Funding Project Estimates - Summary C024179 Current Total Authorized Amount: \$2,15...

Title

Project Number

| | |
|-----------------------|--------------------------------|
| Budget Version | Default (active) |
| Revision | Closure |
| Revision Status | Approved |
| Revision No. | <input type="text" value="7"/> |
| Est Start Date | 04/01/2008 |
| Est Complete Date | 12/01/2009 |
| Est In Srvc Date | 06/01/2009 |
| Capital | \$2,154,000.00 |
| Expense | \$0.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$0.00 |
| Total (excl. Rets.) | \$2,154,000.00 |
| Credits | \$0.00 |
| Net | \$2,154,000.00 |

Revision Info

Revision of 6

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

D



USSC Closure Paper

| | | | |
|---------------------------|-----------------------------------|--------------------------|--|
| Title: | Tiogue #100 MITS Project | Sanction Paper #: | USSC0408PS37C |
| Project #: | C024179, C024180 | Sanction Type: | Closure |
| Operating Company: | The Narragansett Electric Company | Date of Request: | 5-17-16 |
| Author: | Michael Rook/Robert Schneller | Sponsor: | Carol Sedewitz, Acting Vice President, Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Michael Rook/ Robert Schneller |

1 Executive Summary

This paper is presented to close the Tiogue #100 MITS Project. The total spend was \$2.942M. The latest sanctioned amount for this project was \$3.745M.

The final spend amount is \$2.942M broken down into:

- \$2.942M Capex*
- \$0.000 Opex*
- \$0.000 Removal*

2 Project Summary

This project has been successful in addressing the reliability concerns in the Central Rhode Island West (CRIW) area. The substation consists of a Mobile Integrated Transportable Substation (MITS) supplied from an existing 34.5kV supply line situated on a parcel was purchased by National Grid in 2009 at 990 Tiogue Ave in Coventry, R.I. The project construction completed in October 2014 and commissioned in February 2015 is comprised of one 34.5/12.47 kV, 7.5/9.375 MVA transformer, three 7620V, 548A voltage regulators, and one 15 kV 600A recloser.

The Tiogue distribution line work consisted of extending the 34.5kV supply line #3309 from the Kent County Substation #22 tapped at pole #93 approximately 0.4 miles on Tiogue Ave. from Hopkins Hill Rd. to the substation site. A pole top recloser was installed during the substation construction work to complete the distribution line work on pole #93 providing primary protection to this tapped 34.5kV line and backup protection for the MITS. A feeder getaway was installed and the distribution feeders in the area reconfigured to create a new 12.47kV feeder.

USSC Closure Paper



3 Over/Under Expenditure Analysis

3.1 Summary Tables

| Actual Spending (\$M) | | | |
|-----------------------|--------------------------------------|--------------|--------------|
| Project # | Description | | Total Spend |
| C024179 | Tiogue #100 MITS -- Substation | Capex | 2.153 |
| | | Opex | 0.000 |
| | | Removal | 0.000 |
| | | Total | 2.154 |
| Project # | Description | | Total Spend |
| C024180 | Tiogue #100 MITS - Distribution Line | Capex | 0.788 |
| | | Opex | 0.000 |
| | | Removal | 0.000 |
| | | Total | 0.788 |
| Total | | Capex | 2.936 |
| | | Opex | 0.000 |
| | | Removal | 0.000 |
| | | Total | 2.942 |

| Project Sanction Summary Table | | | |
|--|--|-----------------------|--------------------|
| Project Sanction Approval (\$M) | | | Total Spend |
| | | Capex | 3.745 |
| | | Opex | 0.000 |
| | | Removal | 0.000 |
| | | Total Cost | 3.745 |
| Sanction Variance (\$M) | | | Total Spend |
| | | Capex | 0.804 |
| | | Opex | 0.000 |
| | | Removal | 0.000 |
| | | Total Variance | 0.803 |



USSC Closure Paper

3.2 Analysis

The Project successfully met the objective of addressing the reliability concerns in CRIW area while underspending the Sanction amount by \$0.803M. The source of all underspend was within the substation component principally comprised from savings derived from the negotiated site purchase price and a reduced amount of site contamination from the original estimate.

The project initially carried an estimated real estate purchase price of \$2.0M. Fortunately, a parcel adequately sized came to the market only 0.4 miles from the 34.5kV supply line. The final negotiated purchase price of the parcel was \$1.595M, approximately \$400k less than expected.

Based on the historic use of the parcel (public works garage) a limited soil sampling program was conducted during the due diligence period of the purchase. This program identified petroleum present on the site. A conservative cost to remediate this contamination was developed. The actual cost to remediate the site under ran the original estimate making up most of the balance of the total under run.

All of the close out activities have been completed.

4 Improvements / Lessons Learned

A best practice typically performed whenever a project requires soil disturbance is implementation of a sampling program. It is encouraged is to conduct this program as early as permissible and as detailed as possible as it will provide valuable information to cost out and schedule the project.

Another best practice for future substation siting is the proper utilization of a MITS based on the site environment. The Tiogue MITS is sited in a mixed use area of both commercial and high density residential housing. The MITS's general design enclosing equipment in secure cabinets coupled with the underground supply/feeder lines all surrounded by the standard NG fencing provided a high degree of comfort to Town officials and the general public. This comfort translated to a smooth and timely approval of all permits.



USSC Closure Paper

5 Closeout Activities

The following closeout activities have been completed.

| Activity | Completed |
|--|--|
| All work has been completed in accordance with all National Grid policies | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All relevant costs have been charged to project | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All work orders and funding projects have been closed | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All unused materials have been returned | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All as-builts have been completed | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All lessons learned have been entered appropriately into the lesson learned database | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Department | Individual | Responsibilities |
|-----------------------------|-------------------|---|
| Investment Planning | Glen DiConza | Endores relative to 5-year business plan or emergent work |
| Resource Planning | Mark Phillips | Endores construction resources, cost estimate, schedule, and portfolio alignment |
| Asset Management/Planning | Alan Labarre | Endores scope, estimate and schedule with the company's goals, strategies, and objectives |
| Engineering & Design | Susan Martuscello | Endores scope, design, conformance with design standards |
| Project Management | Robert Schneller | Endores resources, cost estimate, and schedule |
| Electric Project Estimation | Jamie Simonds | Endores Cost Estimate |

USSC Closure Paper



6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|-------------------------|-------------------|
| Finance | Patricia Easterly |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegate | Jim Patterson |
| Procurement | Art Curran |
| Control Center | Michael Gallagher |



USSC Closure Paper

7 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on May 17, 2016.

Signature..........Date.....

Christopher Kelly
Acting Senior Vice President
Electric Process & Engineering

C028628

Newport SubTrans & Dist Conversion

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|---|---------------------------------------|
| Fund Project Number: <u>C028628</u> | USSC #: <u>USSC-14-262 v2</u> |
| Revision: <u>7</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Newport SubTrans & Dist Conversion</u> | |
| Project Description: This project is to upgrade the 37K33 feeder from Jepson to the planned Newport Substation, and for conversions/upgrades of the 13.8kV and 4kV systems in Newport. | |

| | |
|---|---|
| Project Status: <u>open</u> | |
| Responsible Person: <u>FIKU, ENDRIT</u> | Initiator: <u>Vaz, Jack P</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>41</u> | Project Complexity Score: <u>33</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|-----------------------|--|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>5/1/2008</u> | | | Est Complete Date: <u>9/30/2023</u> | | |
| Est In-Service Date: <u>9/30/2022</u> | | | | | |
| TTD Actuals: <u>\$3,507,643</u> | | | As Of: <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$5,623,000</u> | <u>\$423,000</u> | <u>\$647,000</u> | <u>\$6,693,000</u> | <u>\$0</u> |

Justification / Risk Identification:
Refer to attached documents for project justification.

Project Scope:
Install 5-13kV feeders at the proposed Newport Substation and reconfigure the area distribution system. Refer to attached document for scope of this work.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

DOA Allocation Attached

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>3/4/2016 13:18:59</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028628 Current Total Authorized Amount: \$6,69...

Title

Project Number

| | |
|---------------------------|--------------------------------|
| Budget Version | Default (active) |
| Revision | v2 |
| Revision Status | Approved |
| Revision No. | <input type="text" value="7"/> |
| Est Start Date | 05/01/2008 |
| Est Complete Date | 09/30/2023 |
| Est In Srvc Date | 09/30/2022 |
| Capital | \$5,623,000.00 |
| Expense | \$423,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$647,000.00 |
| Total (excl. Ret.) | \$6,693,000.00 |
| Credits | \$0.00 |
| Net | \$6,693,000.00 |

Revision Info

Revision of 7

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been redacted for Critical Energy Infrastructure Information (CEII).



US Sanction Paper

| | | | |
|---------------------------|---|--------------------------|--|
| Title: | Aquidneck Island | Sanction Paper #: | USSC-14-262 V2 |
| Project #: | C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 02/10/16 |
| Author: | Ayo Osimboni | Sponsor: | John Gavin Vice President Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Ayo Osimboni |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction in the amount of \$13.937M with a tolerance of ±10% for full implementation of work on Gate 2 Feeder 38W2 and conversion of feeder 122J6, which are part of the distribution work associated with funding # C028628 also work associated with funding # CD00649, Gate 2 Substation D-Sub all of which are part of the Aquidneck Island Reliability Project. This sanction amount will provide funding for the construction activities.

The sanction amount of \$13.937M is broken down into:

- \$ 12.623M Capex
- \$ 0.423M Opex
- \$ 0.891M Removal

NOTE the potential investment of \$55.827M and a tolerance of -25% +50% contingent upon submittal and approval of a Project Sanction paper following completion of all engineering activities.

1.2 Project Summary

Build a 69/13.8kV feeder at Gate 2 substation in the City of Newport to provide short-term relief to the City prior to the construction of the new Newport substation and also begin the upgrade of the distribution lines, Gate 2 Feeder 38W2 and Conversion of Feeder 122J6 which are part of the overall distribution line upgrade for the Aquidneck Island Reliability project.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---------------------------|-----------------------|
| C028628 | D-Line | Newport SubTran & Dist | 17.024 |
| CD00649 | D-Sub | Gate 2 Substation | 1.890 |
| C024159 | D-Line | Newport 69kV line 63 | 1.411 |
| C054054 | D-Line | Jepson Sub | 6.631 |
| C015158 | D-Sub | Newport Sub | 10.557 |
| C054052 | D-Sub | N. Aquidneck Retirement | 0.332 |
| C058310 | D-Sub | Harrison Sub Improvement | 0.326 |
| C058401 | D-Sub | Merton Sub Improvements | 0.387 |
| C058404 | D-Sub | Kingston Sub Improvements | 0.595 |
| C058407 | D-Sub | S. Aquidneck Retirements | 0.342 |
| CD00651 | D-Sub | Bailey Brook Retirement | 0.463 |
| CD00652 | D-Sub | Vernon Retirement | 0.302 |
| CD00656 | D-Sub | Jepson Substation | 15.567 |
| Total | | | 55.827 |

1.4 Associated Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|--------------------------------|-----------------------|
| C041183 | T-Sub | Jepson 115kV Station (T-Sub) | \$13.20 |
| C041184 | T-Line | Line 61/62 Conversion (T-Line) | \$22.70 |
| C041185 | T-Sub | Dexter 115kV Station (T-Sub) | \$3.90 |
| Total | | | \$39.80 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Tolerance |
|------------|-----------------|-------------------|------------------------------|---------------------------------|------------------|-----------|
| 12/10/2014 | USSC | \$10.000M | \$53.585M | Aquidneck Island | Partial Sanction | +/-25% |
| 11/09/2011 | USSC | \$15.000M | \$42.00M | Aquidneck Island | Partial | -25% +50% |
| 12/03/2008 | DCIG | \$15.500M | \$15.50M | Substation Installation Project | Sanction | +/- 25% |
| 04/02/2008 | DCIG | \$3.500M | \$12.30M | Newport Substation Installation | Strategy | +/- 25% |
| 10/11/2005 | Power Plant | \$1.000M | N.A. | Newport Land Purchase | Strategy | N.A. |



US Sanction Paper

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|---|
| June 2017 | Project Sanction (Distribution Line Work) |

1.7 Category

| Category | Reference to Mandate, Policy, NPV, or Other |
|---|--|
| <input type="radio"/> Mandatory | National Grid USA Internal Strategy Document Distribution Planning Criteria Strategy Issue 1 – February 2011 |
| <input checked="" type="radio"/> Policy- Driven | |
| <input type="radio"/> Justified NPV | |
| <input type="radio"/> Other | |

1.8 Asset Management Risk Score

Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 33

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--|---|--|--|
| FY17-2021 New England Distribution Electric capital Plan | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | 9.774M |

1.12 If cost > approved Business Plan how will this be funded?

Inclusion of dollars in future plans and approval by Rhode Island PUC through the annual ISR Approval process will be required.

1.13 Current Planning Horizon

| \$M | Prior Yrs | Current Planning Horizon | | | | | | Total |
|--------------------|--------------|--------------------------|--------------|---------------|---------------|--------------|--------------|---------------|
| | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | |
| CapEx | 3.971 | 3.676 | 5.247 | 15.705 | 11.978 | 5.523 | 0.000 | 46.100 |
| OpEx | 0.063 | 0.277 | 0.381 | 1.161 | 1.911 | 0.524 | 0.000 | 4.317 |
| Removal | 0.060 | 0.583 | 0.774 | 1.819 | 1.650 | 0.524 | 0.000 | 5.410 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 4.094 | 4.536 | 6.402 | 18.685 | 15.539 | 6.571 | 0.000 | 55.827 |

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Partial Sanction for Dline Project | February 2016 |
| Construction Complete - Gate 2 Feeder | March 2016 |
| Ready for Load - Gate 2 Feeder | June 2016 |
| EFSB Decision - 115kV Reinforcements | March 2017 |
| Engineering Design Complete 4kV Station Upgrades | June 2017 |
| Construction Start – 4kV Station Upgrades | June 2017 |
| Engineering Design Complete Newport Substation | March 2018 |



US Sanction Paper

| Milestone | Target Date: (Month/Year) |
|---|---------------------------|
| Construction Start - Newport Substation | April 2018 |
| Engineering Design Complete Jepson Substation | August 2018 |
| Construction Start – Jepson Substation | September 2018 |
| Construction Complete - Newport Substation | September. 2019 |
| Construction Start – 4kV Station Retirements | December 2019 |
| Ready for Load - Newport Substation | December 2019 |
| Construction Complete – 4kV Station Upgrades | March 2020 |
| Construction Complete – Jepson Substation | March 2020 |
| Ready for Load - Jepson Substation | November 2020 |
| Engineering Design Complete Station Retirements | September 2022 |
| Project Closure Report | September 2023 |

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|--|
| 1 | State and local permits are required to build Newport substation and the distribution line work. |
| 2 | The ER report was filled with the Energy Facility Siting Board (EFSB) on |



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| | |
|---|--|
| | December 30 th 2015 for the proposed Jepson substation and 61/62 line upgrade. |
| 3 | Navy approval to build the 13.8kV feeder at Gate 2 substation has been received but we still need their approval to build the 69kV tap to proposed Newport substation. |
| 4 | A major public outreach effort is ongoing for communities impacted by the substation construction and distribution line construction and conversion work. |
| 5 | Coordination with RIDOT is ongoing to review compliance with the Americans with Disabilities Act (ADA) for new pole sets or pole replacements. |
| 6 | A traffic mitigation plan is needed for the distribution line construction and the proposed conversion work. |

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |

1.18 List References

| | |
|---|---|
| 1 | Distribution Planning Criteria Strategy, Issue 1, February 2011 |
| 2 | Conceptual Engineering Report, Newport Mall Substation, 7/20/11 |
| 3 | Conceptual Engineering Report, Gate 2 Substation, 7/21/11 |
| 4 | Conceptual Engineering Report, Jepson Substation, 7/22/11 |
| 5 | Conceptual Engineering Report, Bailey Brook Substation, 7/25/11 |
| 6 | Conceptual Engineering Report, Vernon Substation, 7/25/11 |
| 7 | Newport Area Supply and Distribution Study, May 2007 |
| 8 | Jepson Equipment Condition Assessment, February 2005 |



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2 Decisions

The Senior Executive Sanctioning Committee Committee (SESC) at a meeting held on 02/22/16:

(a) APPROVED the investment of \$13.937M and a tolerance of +/- 10% for construction activities associated with building the 69/13.8kV feeder at Gate 2 substation and begin the distribution upgrade of Gate 2 feeder 38W2 and 122J6 which are all part of Aquidneck Island Reliability Project.

(b) NOTED the potential distribution investment \$55.827M to and a tolerance of -25% +50%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Ayo Osimboni has the approved financial delegation to undertake the activities stated in (a).

Signature Margaret M Smyth Date 3/1/16
 Margaret Smyth
 US Chief Financial Officer
 Chair, Senior Executive Sanctioning Committee

US Sanction Paper



3 Sanction Paper Detail

| | | | |
|---------------------------|---|--------------------------|---|
| Title: | Aquidneck Island | Sanction Paper #: | USSC-14-262 V2 |
| Project #: | C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 02/10/16 |
| Author: | Ayo Osimboni | Sponsor: | John Gauvin Vice President Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Ayo Osimboni |

3.1 Background

The Newport Study Area encompasses the City of Newport and the towns of Portsmouth, Middletown, Jamestown and Prudence Island. Figure 1 shows a geographic map of the study area. The area has approximately 34,000 customers with a peak load of 146MW. Aquidneck Island has most of the load and peaks at 135MW, Jamestown peaks at 10MW and Prudence Island at 1MW.

The area is supplied by two (2) 115kV lines (L14 & M13) which terminate on the northern half of Aquidneck Island at Dexter substation. From Dexter substation, two (2) 69 kV lines (Lines 61 & 62) continue south to supply Jepson substation. From Jepson substation, a single 69kV line (Line 63) continues south to supply the US Naval Base (Navy 1 substation) and Gate 2 Substation. Figure 2 shows a one-line of the existing transmission system.

A single 115/13.8kV transformer at Dexter supplies the distribution load on the northern section of Aquidneck Island and a single 69/13.8kV transformer at Jepson supplies the middle section of the Island. The remainder of the load is supplied by five (5) 23kV lines sourced from Jepson and Gate 2 substations which supply a 4.16kV distribution system with approximately 70MW of load. Twelve 23/4.16kV substations, ten located in the southern half of Aquidneck Island and two in Jamestown, supply this 4.16kV system. Figure 3 shows a one-line of the existing sub-transmission system and Figure 4 shows the approximate geographic areas supplied by the distribution system.



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Interruptions to the Newport electrical system resulting in significant customer outages occurred in the summer of 2003. One of the action items proposed by the Company to the Rhode Island Public Utility Commission (RI PUC) was to conduct a planning study to identify and resolve electrical related issues in the area.

This area study was published in May 2007 and titled "The Newport Area Supply and Distribution Study". The Study identified an immediate need to build a new substation in the City of Newport to address both normal and contingency overloads. The study recommended construction of a new substation consisting of a single transformer supplying four (4) 13.8kV feeders. The new station was to be sourced from Line 63, a radial 69kV supply line that supplies the US Navy and Gate 2 substations.

Construction of a new substation was contingent on the company acquiring a parcel of land in Newport for this substation. The Company encountered significant challenges in acquiring a suitable land parcel which has impacted the in-service date of this substation. To address critical loading concerns in the City of Newport, the 2008 Annual Plan recommended accelerating some of the distribution construction identified in the 2007 study and recommended redistributing the area load on the supply and distribution systems to optimize all available capacity. All recommended investments are complete.

In 2011, the Company purchased a parcel of land in the City of Newport suitable for a new substation. The company successfully worked with the city to amend the zoning ordinance to allow a substation to be built via a special permit. The substation site was encumbered by a lease that was released by the tenant in 2014. The substation construction is projected to start in the spring 2018 with an in-service date of fall 2019.

Transmission Planning has recently completed a review of the Aquidneck Island transmission supply system. This review identified various n-1 thermal overloads and voltage issues throughout Aquidneck Island. The review identified a need to upgrade the 69kV lines from Dexter to Jepson substation to 115kV and the need to rebuild Jepson substation as an 115kV station. The review also identified various asset condition, safety, and environmental concerns with Jepson substation.

Jepson substation consists of a 69kV station, a 23kV station, a 13.8kV station, and a 4.16kV station. The station is located within the 100 year floodplain and directly adjacent to Sisson Pond and entirely within Zone A Watershed Protection Overlay. The station will be rebuilt on company owned land in Middletown and outside the 100 year floodplain and the Zone A Watershed Protection Overlay. The existing station will be retired and all equipment removed.

The new 115kV station in Middletown will be part of a transmission sanction paper along with the upgrades of the 69kV lines to 115kV and modifications to Dexter substation. The new 115/23kV station and the new 115/13.8kV station is part of the sanction for the Distribution Line Project. The existing 23/4.16kV station will be retired and load converted to the 13.8kV system. This is the most economical approach as opposed to building a new 23/4.16kV station in Middletown.



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3.2 Drivers

The primary driver of this project is reliability. Aquidneck Island is supplied by a highly utilized supply and distribution system. It is increasingly challenging to supply load in southern Middletown and in the City of Newport. The Jepson 13.8kV system has been utilized to provide relief to the 23kV supply system and the 4.16kV distribution system. However, this 13.8kV system has been extended to its limits.

The 23kV supply system is a mixture of overhead and underground construction in Middletown and predominantly underground construction in Newport. The underground system consists mostly of paper and lead cable installed in 3-inch ducts. The 3-inch ducts are not suitable to house required solid dielectric cables, making upgrades to the 23kV supply system challenging and costly.

For loss of the Dexter 115/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 540MWh.

For loss of the Jepson 69/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 550MWh.

For loss of the 69kV line section between Jepson and the Navy substation on peak approximately 21MW of load on Aquidneck Island would remain un-served resulting in an estimated exposure of 500MWh.

A number of 23/4.16kV stations in the area have asset condition, safety, environmental, and thermal concerns which need to be addressed. The recommendation is to retire these stations. This recommendation is part of a comprehensive solution developed for Aquidneck Island to address all concerns at least cost.

In the summer of 2003, interruptions to the electrical system in Newport resulted in significant customer outages. One of the action items proposed by the Company to the Rhode Island Public Utility Commission was to conduct a planning study to identify and resolve electrical related issues in the area.

3.3 Project Description

Install a 69/13.8kV feeder at Gate 2 substation in the City of Newport with a recommended in-service date of March 2016. This feeder addresses near-term thermal concerns in Newport until a new substation is built to provide the required long-term relief. All the work associated with this feeder is in-line with the long-term plan for the area resulting in no out of line expenditures.

Build a new 69/13.8kV substation in Newport on a parcel of land recently purchased for this purpose. The substation will consist of a single transformer supplying four (4) 13.8kV feeders. A short 69kV tap is required to supply this station. A one-line of the proposed station is shown on Figure 5.

Build a new substation in Middletown (Jepson Substation) on company owned land. The substation will consist of two (2) 115/13.8kV transformers supplying six (6) feeders and



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two (2) 115/23kV transformers supplying three (3) supply lines. A new 115kV station will also be built on this site to replace the existing Jepson 69kV substation. This 115kV station will be sanctioned separately as part of transmission reinforcements required on Aquidneck Island. A one-line of the proposed 115/23kV station is shown on Figure 6. A one-line of the proposed 115/13.8kV station is shown on Figure 7.

The 23kV supply system on Aquidneck Island needs relief. The most economical approach is to retire a number of 23/4.16kV stations and to convert the load to the 13.8kV system. This approach addresses asset condition, safety, environmental, thermal, and reliability concerns with these assets at least cost. This approach is part of a comprehensive solution that eliminates the need to install a new 69kV line to Newport (a \$32M investment). This approach retires four 23/4.16kV stations which include:

- Vernon substation is a metal-clad station built in 1949. It has two transformers, TR231 installed in 1949 and TR232 installed in 1963. The metal-clad switchgear is obsolete and needs to be replaced to address safety & reliability concerns. Station breakers are obsolete and the TR231 needs to be replaced due to poor condition. The estimated cost to rebuild this station is \$4.90M. The retirement of this station eliminates this \$4.9M investment.
- Bailey Brook was built in 1941 on a small site with no room for expansion. It is located within local wetlands and adjacent to a brook that is the source of island water supply. Rebuilding the station outside the floodplain is not an economical approach because station is located in downtown Middletown and in a congested area. Locating and permitting a new site is not practical or economical. There is no economic or reliability benefit to keeping this station.
- South Aquidneck is a metal-clad station located within the flood plain. It has a single LTC transformer supplying 3-feeders. The station breakers are obsolete along with the station insulators and arresters. The estimated cost to address these concerns is \$0.80M. However, this station cannot be offloaded due to lack of feeder ties and because the site is too small to install a mobile transformer. The LTC is an arcing in oil design which requires a higher level of maintenance.
- North Aquidneck is a metal-clad station with a single transformer supplying 3-feeders. The station has non-standard breakers and limited EMS. The LTC is an arcing in oil design which requires a higher level of maintenance. Station has similar offloading challenges to South Aquidneck making station maintenance very challenging.

The retirement of these 4.16kV station increases the reliability on the 13.8kV distribution system with increased feeder ties. The conversion of the 4.16kV load to 13.8kV also reduces line losses by approximately 90%. A one-line of the proposed station retirements is shown on Figure 8.



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3.4 Benefits Summary

The recommended plan is in-line with commitments made by the Company to state regulators. The plan is part of a comprehensive solution for Aquidneck Island and addresses all asset condition, safety, environmental, thermal, and reliability concerns at the least cost.

Plan introduces new 13.8kV capacity in the heart of the existing Newport 4.16kV system sourced from the 69kV supply system. No load will be left un-served for loss of a transformer or supply line resulting in a very reliable supply to the City of Newport and southern Middletown.

Plan provides capacity to supply load growth on Aquidneck Island well beyond the study horizon period at relatively low cost. Spare capacity will exist at Dexter, Jepson and Newport substations to supply future load growth.

Plan eliminates substation equipment in need of replacement or upgrades; eliminates the need to upgrade manhole and ductline infrastructure to reinforce the 23kV supply system; and eliminates the need for a second 69kV line into Newport.

3.5 Business and Customer Issues

The project follows up on action items proposed by the Company to the Rhode Island Public Utility Commission to identify and resolve electrical related issues in the area as a result of interruptions to the Newport electrical system resulting in significant customer outages that occurred in the summer of 2003. Failure to execute this project may impact commitment made by the Company to state regulators.

3.6 Alternatives

Alternative 1: New 69kV Line to Newport and substation additions (\$82.85M)

Construct a new 69kV underground transmission line from the new 115kV substation in Middletown to the new substation in Newport. A comprehensive routing analysis was completed for this supply line and this analysis concluded the line would have to be built underground on city streets.

Construct a new 115/13.8kV and a new 115/23kV substation in Middletown (Jepson Substation) on the site of the proposed 115kV station. The 115/13.8kV station would consist of a single transformer supplying metal-clad switchgear with (4) 13.8kV feeder positions. The 115/23kV station would consist of two (2) transformers supplying metal-clad switchgear with (3) 23kV supply lines.

Construct a new 69/13.8kV substation in Newport on a parcel of land recently acquired for this purpose. The station would consist of two (2) transformers supplying metal-clad switchgear with (8) 13.8kV feeder positions with five feeders being initially installed.



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The 115/23kV station would consist of two (2) transformers supplying metal-clad switchgear with (3) 23kV supply lines.

This alternative would retire North Aquidneck, South Aquidneck, Bailey Brook, and Vernon substations to relieve the highly loaded 23kV supply system and is part of a comprehensive solution to address asset condition, environmental, thermal, and reliability concerns at least cost. Upgrading the 23kV supply system is not an economical approach since most of the infrastructure consists of small paper and lead cable installed in 3-inch ductline. The small ductline is not suitable to house the required larger solid dielectric cables. Upgrading this infrastructure is not recommended due to the significant cost impact.

The estimated cost of this plan is \$82.85M, or \$29.00M higher than the preferred plan. This plan has similar reliability benefits to the preferred plan. However, there is no economic or reliability benefit to implement this plan over the preferred plan.

Alternative 2: Non-Wires Alternative

The recommended plan is part of a comprehensive solution to address asset condition, safety, reliability, and environmental concerns on Aquidneck Island. The need for these investments is immediate. Due to the immediate need for these investment and because many concerns are related to asset condition and environmental issues, a non-wires solution is not applicable. New supply and distribution capacity is the only reasonable alternative to address the identified concerns.

3.7 Safety, Environmental and Project Planning Issues

A filing to the Rhode Island Energy Facility Siting Board (“EFSB”) is required to build the proposed new 115kV substation in Middletown and to upgrade the 69kV lines (Line 61 and Line 62) to 115kV. The ER report was filed on December 23rd 2015 with the board.

An Environmental Report is required to support the application to the EFSB for construction of jurisdictional facilities. The Environmental Report was prepared in accordance with the EFSB Rules to provide information on the potential environmental impacts of the electric transmission system improvements proposed by National Grid.

Voltage conversions are required to upgrade the distribution system from 4.16kV to 13.8kV in Newport and Middletown. Outages are required to energize the converted areas at 13.8kV. These conversions and outages may have to occur during off hours or winter months to avoid conflicts with the City of Newport’s tourist season.



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3.8 Execution Risk Appraisal

| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Risk Owner | Comments/Actions |
|--------|---|-------------|--------|----------|-------|----------|----------|--|---|
| | | | Cost | Schedule | Cost | Schedule | | | |
| 1 | Drawn out EFSB approval of Jepson substation relocation. | 3 | 3 | 5 | 9 | 9 | Mitigate | Project Manager/RDW | Meet with abutters during stakeholder outreach process to discuss mitigative measures. |
| 2 | Limited opportunities for outage for Line 63 Loop construction. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Schedule construction to finish during off peak period. |
| 3 | Construction delays due to poor weather or damage from major storms. | 2 | 3 | 3 | 6 | 6 | Accept | Project Manager | Create some slack within the schedule |
| 4 | Limited opportunities for outage for Newport Substation connection to Line 63. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Gate 2 has a breaker position that may be used to prevent the need for or an outage. Working with the engineering team to decide best options to eliminate the need for an outage. |
| 5 | Drawn out EFSB approval of Line 61/62 conversions. | 3 | 1 | 5 | 6 | 9 | Mitigate | Legal/RDW/PM | Public outreach consultant (RDW) has been brought onto the project team. |
| 6 | Limited opportunities for Line 61/62 outages for construction cutovers. | 4 | 1 | 3 | 4 | 12 | Mitigate | Project Manager/Construction Supervisor | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Construction will be scheduled so that cutovers will be performed during off peak periods. |
| 7 | Limited opportunities for Jepson Substation construction cutovers. | 3 | 1 | 3 | 4 | 9 | Mitigate | Project Manager | Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. |
| 8 | Limited opportunities for distribution system outages for cutovers during construction. | 5 | 1 | 5 | 5 | 9 | Mitigate | Project Manager | An outage coordination consultant will be brought onto the project team. |
| 9 | Change in ADA clearance requirement from 3' to 4' during design/construction | 2 | 2 | 2 | 4 | 4 | Avoid | Project Manager/Legal | Obtain construction permits from DOT early prior to possible change in ADA regulations. |
| 10 | Construction delays due to other utilities not transferring their lines within the project schedule. | 4 | 1 | 3 | 4 | 12 | Avoid | Project Manager/Construction Supervisor | Coordinate construction plan with Verizon during constructability review process. Coordination during design has started and will be maintained through project. |
| 11 | General public opposition to the project. | 3 | 2 | 4 | 6 | 12 | Mitigate | RDW/PM/Outreach Group | Public outreach consultant (RDW) has been brought onto the project team. Project information (facts sheets/talking points) for all projects on Aquidneck Island to be developed. |
| 12 | Negative impacts to wetlands contained on Jepson substation parcel during construction/relocation. | 2 | 2 | 2 | 4 | 4 | Mitigate | VHB/Substation Engineering/Construction Supervisor | VHIB has delineated all wetlands and will ID construction mitigation requirements. Design will account for minimizing wetlands impacts. Construction activities will need to follow SESC measures. |
| 13 | FAA may require certain mitigative measures for construction near Newport Airport. | 3 | 2 | 1 | 6 | 6 | Accept | Distribution Design | Submit required documentation for each pole to be installed early in the design process. |
| 14 | Majority of the distribution and subtransmission work is on well traveled roadways. | 5 | 3 | 1 | 9 | 5 | Accept | Distribution Line Construction/Contractor | Develop traffic control and detour plans for the project and perform extensive coordination with the DOT and cities/towns. |
| 15 | Numerous poles appear to be encroaching on private property and easements/rights are believed to not have been obtained. | 4 | 1 | 1 | 4 | 4 | Accept | Real Estate/PM | Budget and time to be allocated to obtain proper rights/easements as required. |
| 16 | Approval to install 2 additional steel poles within the existing easement with US Navy along Line 63 involves extensive coordination and takes a significant amount of time to get the necessary approvals. | 5 | 1 | 5 | 5 | 9 | Accept | Real Estate/PM | Early coordination with the navy has begun and will continue so as to mitigate the issue prior to commencement of construction. |
| 17 | Approval from US Navy for Gate 2 substation work is required from base commander. Construction work at the substation is schedule to begin in mid 2015 | 5 | 1 | 5 | 5 | 9 | Accept | Real Estate/PM | Early coordination with the Navy has begun in order to mitigate this issue. |
| 18 | Limited construction windows for work in Middletown and Newport. | 4 | 2 | 5 | 8 | 9 | Accept | Project Manager | Extensive coordination of all construction activities and schedule, traffic management plan, detour plans etc will be necessary in advance of any construction work. |



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3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|---|--|----------------------------|--|---------------------------|
| RIDEM Permit | Likely | 6 months | Not Applied For | TBD |
| Newport - Special Use Permit | Certain | 7 months | Not Applied For | 10/31/17 |
| EFSB Permit Approval – Jepson substation and 61/62 line Upgrade | Likely | 12 to 18 months | In-progress | 03/31/17 |
| Road Opening Permit | Certain | 3 months | Not Applied For | TBD |
| Building Permit | Certain | 4 months | Not Applied For | TBD |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by the appropriate agencies.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$9.247M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

N/A



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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table: Distribution Project

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total |
|------------------------|---------------------------|----------------------------|-------------|-----------|--------------------------|---------|---------|---------|---------|---------|--------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | |
| | | | | | 2016/17 | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | |
| C028626 | Newport SubTran & Dist | Est Lw (e.g +/- 25%) | CapEx | 0.752 | 2.022 | 3.620 | 3.620 | 3.620 | 0.000 | 0.000 | 13.634 |
| | | | OpEx | 0.011 | 0.213 | 0.272 | 0.272 | 0.453 | 0.000 | 0.000 | 1.221 |
| | | | Removal | 0.022 | 0.426 | 0.634 | 0.634 | 0.453 | 0.000 | 0.000 | 2.169 |
| | | | Total | 0.785 | 2.661 | 4.526 | 4.526 | 4.526 | 0.000 | 0.000 | 17.024 |
| CD00649 | Gate 2 Substation | Est Lw (e.g +/- 25%) | CapEx | 1.804 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.804 |
| | | | OpEx | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.051 |
| | | | Removal | 0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.035 |
| | | | Total | 1.890 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.890 |
| C024159 | Newport 69kV line 63 | Est Lw (e.g +/- 25%) | CapEx | 0.156 | 0.093 | 0.108 | 0.855 | 0.000 | 0.000 | 0.000 | 1.212 |
| | | | OpEx | 0.000 | 0.000 | 0.007 | 0.052 | 0.000 | 0.000 | 0.000 | 0.059 |
| | | | Removal | 0.000 | 0.000 | 0.016 | 0.124 | 0.000 | 0.000 | 0.000 | 0.140 |
| | | | Total | 0.156 | 0.093 | 0.131 | 1.031 | 0.000 | 0.000 | 0.000 | 1.411 |
| C054054 | Jepson Sub | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.320 | 0.078 | 2.580 | 1.940 | 1.523 | 0.000 | 6.441 |
| | | | OpEx | 0.000 | 0.000 | 0.001 | 0.040 | 0.030 | 0.024 | 0.000 | 0.095 |
| | | | Removal | 0.000 | 0.000 | 0.001 | 0.040 | 0.030 | 0.024 | 0.000 | 0.095 |
| | | | Total | 0.000 | 0.320 | 0.080 | 2.660 | 2.000 | 1.571 | 0.000 | 6.631 |
| C015158 | Newport Sub | Est Lw (e.g +/- 25%) | CapEx | 1.124 | 1.028 | 1.153 | 3.943 | 1.944 | 0.000 | 0.000 | 9.192 |
| | | | OpEx | 0.001 | 0.044 | 0.050 | 0.170 | 0.840 | 0.000 | 0.000 | 1.105 |
| | | | Removal | 0.000 | 0.033 | 0.037 | 0.127 | 0.063 | 0.000 | 0.000 | 0.260 |
| | | | Total | 1.125 | 1.105 | 1.240 | 4.240 | 2.847 | 0.000 | 0.000 | 10.557 |
| C054052 | N. Aquidneck Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.032 | 0.010 | 0.110 | 0.180 | 0.000 | 0.000 | 0.332 |
| | | | Total | 0.000 | 0.032 | 0.010 | 0.110 | 0.180 | 0.000 | 0.000 | 0.332 |
| C058310 | Harrison Sub Improvement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.023 | 0.151 | 0.100 | 0.000 | 0.000 | 0.274 |
| | | | OpEx | 0.000 | 0.000 | 0.012 | 0.025 | 0.015 | 0.000 | 0.000 | 0.052 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.000 | 0.035 | 0.176 | 0.115 | 0.000 | 0.000 | 0.326 |
| C058401 | Merton Sub Improvements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.052 | 0.023 | 0.155 | 0.104 | 0.000 | 0.000 | 0.334 |
| | | | OpEx | 0.000 | 0.000 | 0.012 | 0.025 | 0.016 | 0.000 | 0.000 | 0.053 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.052 | 0.035 | 0.180 | 0.120 | 0.000 | 0.000 | 0.387 |
| C058404 | Kingston Sub Improvements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.114 | 0.212 | 0.162 | 0.000 | 0.000 | 0.488 |
| | | | OpEx | 0.000 | 0.000 | 0.011 | 0.053 | 0.043 | 0.000 | 0.000 | 0.107 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.000 | 0.125 | 0.265 | 0.205 | 0.000 | 0.000 | 0.595 |
| C058407 | S. Aquidneck Retirements | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.032 | 0.020 | 0.110 | 0.180 | 0.000 | 0.000 | 0.342 |
| | | | Total | 0.000 | 0.032 | 0.020 | 0.110 | 0.180 | 0.000 | 0.000 | 0.342 |
| CD00651 | Bailey Brook Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.003 | 0.040 | 0.040 | 0.150 | 0.230 | 0.000 | 0.000 | 0.463 |
| | | | Total | 0.003 | 0.040 | 0.040 | 0.150 | 0.230 | 0.000 | 0.000 | 0.463 |
| CD00652 | Vernon Retirement | Est Lw (e.g +/- 25%) | CapEx | 0.000 | 0.000 | 0.023 | 0.109 | 0.108 | 0.000 | 0.000 | 0.240 |
| | | | OpEx | 0.000 | 0.000 | 0.003 | 0.014 | 0.014 | 0.000 | 0.000 | 0.031 |
| | | | Removal | 0.000 | 0.000 | 0.003 | 0.014 | 0.014 | 0.000 | 0.000 | 0.031 |
| | | | Total | 0.000 | 0.000 | 0.029 | 0.137 | 0.136 | 0.000 | 0.000 | 0.302 |
| CD00656 | Jepson Substation | Est Lw (e.g +/- 10%) | CapEx | 0.135 | 0.161 | 0.105 | 4.080 | 4.000 | 4.000 | 0.000 | 12.481 |
| | | | OpEx | 0.000 | 0.020 | 0.013 | 0.510 | 0.500 | 0.500 | 0.000 | 1.543 |
| | | | Removal | 0.000 | 0.020 | 0.013 | 0.510 | 0.500 | 0.500 | 0.000 | 1.543 |
| | | | Total | 0.135 | 0.201 | 0.131 | 5.100 | 5.000 | 5.000 | 0.000 | 15.567 |
| Total Project Sanction | | | CapEx | 3.971 | 3.676 | 5.247 | 15.705 | 11.978 | 5.523 | 0.000 | 46.100 |
| | | | OpEx | 0.063 | 0.277 | 0.381 | 1.161 | 1.911 | 0.524 | 0.000 | 4.317 |
| | | | Removal | 0.060 | 0.583 | 0.774 | 1.819 | 1.650 | 0.524 | 0.000 | 5.410 |
| | | | Total | 4.094 | 4.536 | 6.402 | 18.685 | 15.539 | 6.571 | 0.000 | 55.827 |



US Sanction Paper

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|---------------|
| | | Yr. 1 2016/17 | Yr. 2 2017/18 | Yr. 3 2018/19 | Yr. 4 2019/20 | Yr. 5 2020/21 | Yr. 6 + 2021/22 | |
| \$M | | | | | | | | |
| CapEx | 3.971 | 2.882 | 7.225 | 16.687 | 11.600 | 1.200 | 0.000 | 43.565 |
| OpEx | 0.063 | 0.190 | 0.426 | 1.088 | 0.783 | 0.036 | 0.000 | 2.586 |
| Removal | 0.060 | 0.361 | 0.544 | 1.499 | 1.508 | 0.024 | 0.000 | 3.996 |
| Total Cost in Bus. Plan | 4.094 | 3.433 | 8.195 | 19.274 | 13.891 | 1.260 | 0.000 | 50.147 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2016/17 | Yr. 2 2017/18 | Yr. 3 2018/19 | Yr. 4 2019/20 | Yr. 5 2020/21 | Yr. 6 + 2021/22 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | (0.794) | 1.978 | 0.982 | (0.378) | (4.323) | 0.000 | (2.535) |
| OpEx | 0.000 | (0.087) | 0.045 | (0.073) | (1.128) | (0.488) | 0.000 | (1.731) |
| Removal | 0.000 | (0.222) | (0.230) | (0.320) | (0.142) | (0.500) | 0.000 | (1.414) |
| Total Cost in Bus. Plan | 0.000 | (1.103) | 1.793 | 0.589 | (1.648) | (5.311) | 0.000 | (5.680) |

3.11.3 Cost Assumptions

Substation estimates were obtained from Conceptual Engineering Reports prepared by substation engineering. Conceptual Grade Estimates have been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The estimate for the 69kV transmission line was obtained from Routing Analysis Report prepared by transmission line engineering and consultants to the company. This Conceptual Engineering Estimate has been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The overall distribution line work estimate was developed utilizing generic construction costs. Minimal field work has been performed to assess the actual condition of the assets or the number of poles and transformers needing replacement associated with the conversion from 4kV to 13kV. This is an Investment Grade Estimate with a level of accuracy ranging from -50% to +200%.for

The estimates for the distribution work to be completed under funding C028628 and CD00649 are based on STORMS estimate.

3.11.4 Net Present Value / Cost Benefit Analysis

N/A



US Sanction Paper

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

None

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Role | Individual | Responsibilities |
|----------------------------|-------------------|---|
| Investment Planning | Glen DiConza | Endorses relative to distribution 5-year business plan or emergent work |
| Resource Planning | Anne Wyman | Endorses D-Line resources, cost estimate, schedule and portfolio alignment |
| Resource Planning | Mark Phillips | Endorses substation resources, cost estimate, schedule and portfolio alignment |
| Asset Management/ Planning | Kasia Kulbacka | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Asset Management/ Planning | Alan Labarre | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Engineering / Design | Suzan Martuscello | Endorses substation scope, design, conformance with design standards |
| Engineering / Design | Mark Browne | Endorses sub-transmission line scope, design, conformance with design standards |
| Engineering / Design | Len Swanson | Endorses substation scope, design, conformance with design standards |
| Project Management | Andrew Schneller | Endorses Resources, cost estimate, schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|--------------------------|---------------------------------|
| Finance | Keith Fowler / Phillip Horowitz |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegates | Jim Patterson |
| Procurement | Art Curran |
| Control Center | Michael Gallagher |
| Control Center | Will Houston |



US Sanction Paper

4 Appendices

4.1 Sanction Request Breakdown by Project

| \$M | C028628 | CD00649 | C024159 | C054054 | C015158 | C054052 | C058310 | CD00656 | CD00652 | CD058404 | C058407 | C058401 | CD00651 | Total |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|---------|--------|
| CapEx | 5.623 | 2.200 | 0.200 | 0.800 | 1.000 | | 0.050 | 2.100 | | 0.600 | | 0.050 | | 12.623 |
| OpEx | 0.423 | | | | | | | | | | | | | 0.423 |
| Removal | 0.647 | 0.044 | | | | 0.050 | | | 0.050 | | 0.050 | | 0.050 | 0.891 |
| Total | 6.693 | 2.244 | 0.200 | 0.800 | 1.000 | 0.050 | 0.050 | 2.100 | 0.050 | 0.600 | 0.050 | 0.050 | 0.050 | 13.937 |

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

A Customer Outreach is ongoing as part of the Energy Facilities Siting Board (EFSB) Filing process. The company has hired a consultant to develop a comprehensive public outreach plan for all of proposed projects on Aquidneck Island.

This outreach effort will be part of a comprehensive and proactive public outreach process to establish and maintain communications with stakeholders (e.g., project abutters, residents, businesses, federal, state and local officials, and community groups).

This process will include opportunities for public education and communication regarding the need for the Project, the permitting and siting processes, the detailed construction plans, the dissemination of construction updates and outreach prior to and during construction, and follow-up outreach after Project completion. The process will be designed to engage the community in a two-way dialogue, facilitate transparency throughout the Project, foster public participation, and solicit feedback from stakeholders.

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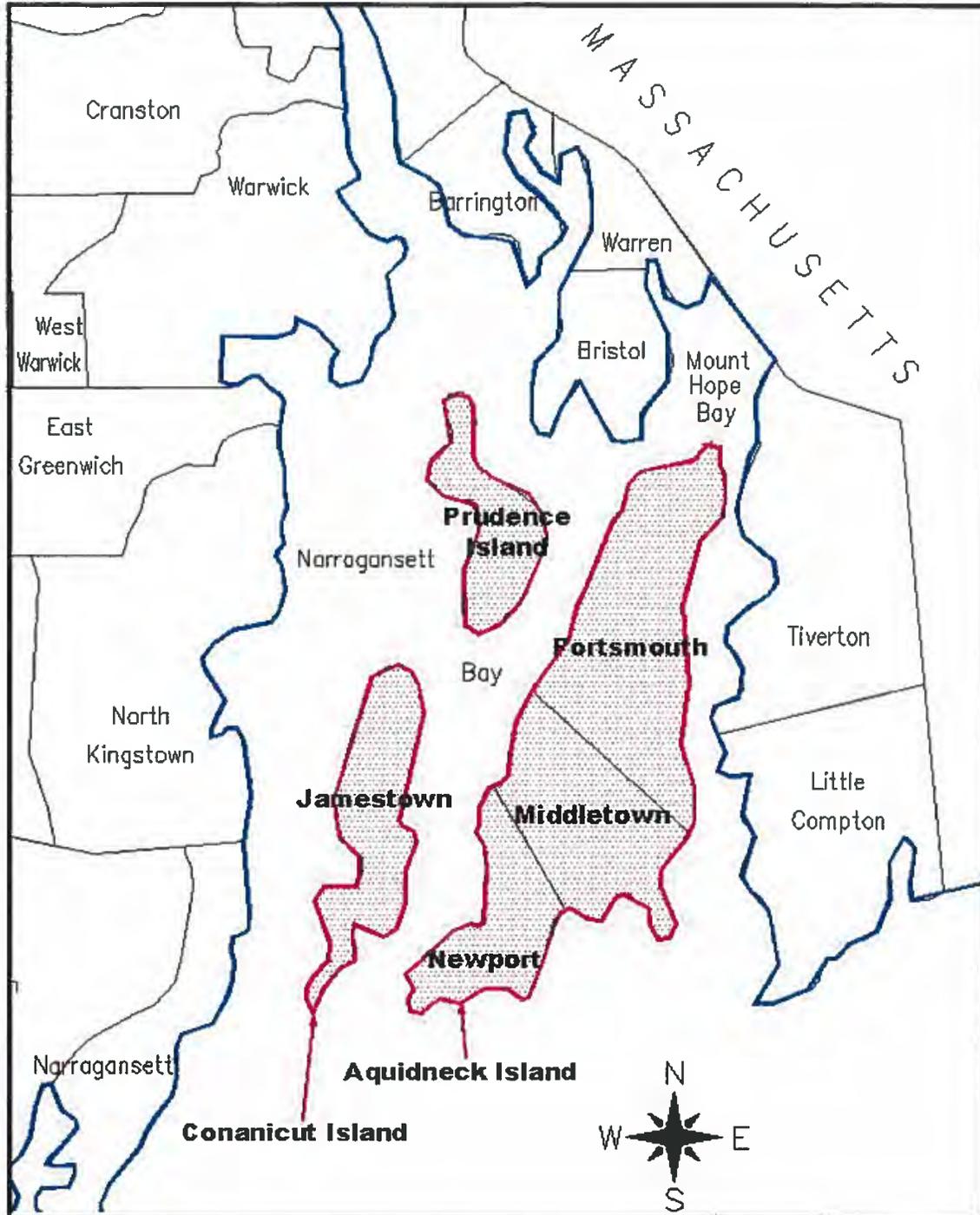
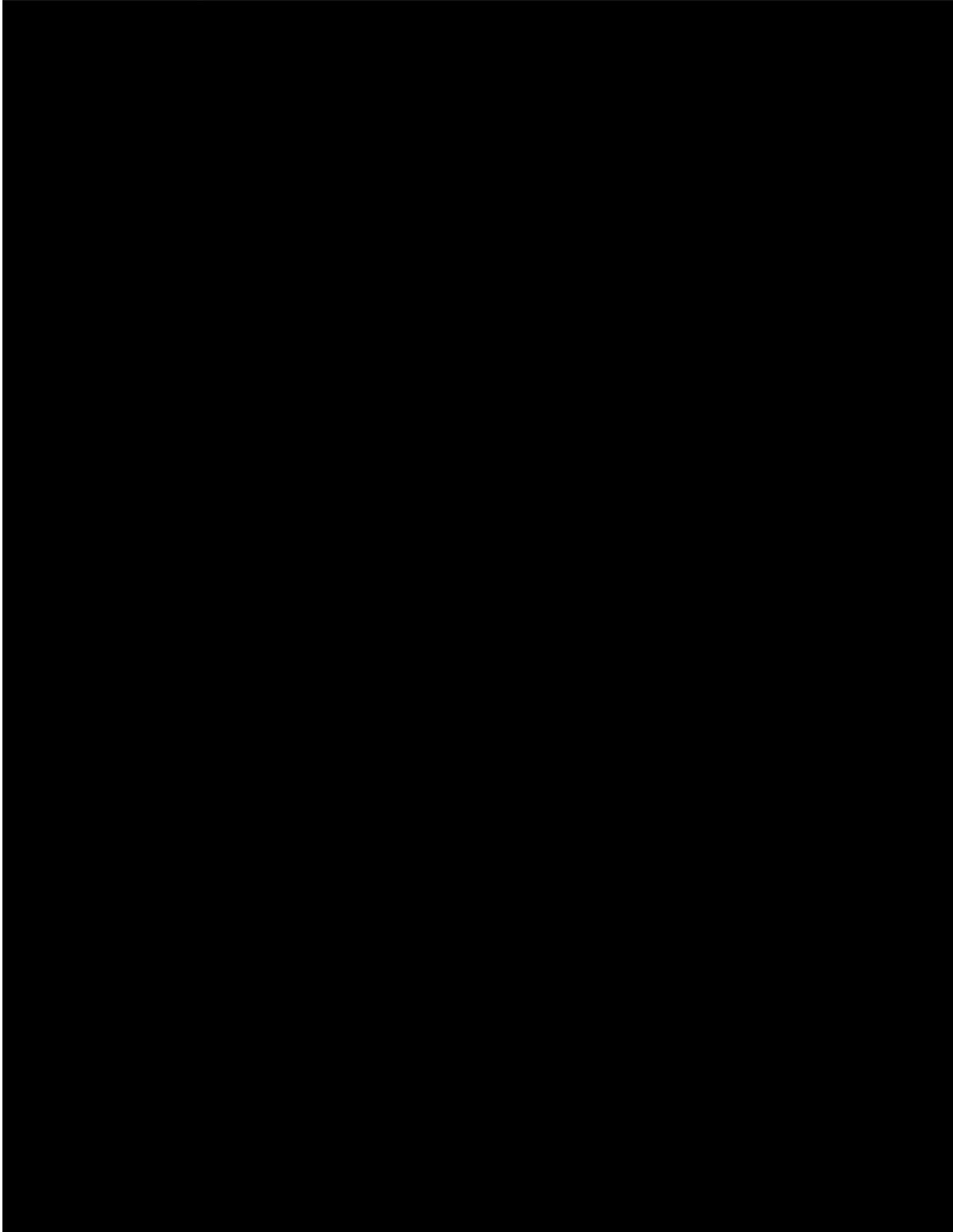


FIGURE 1 – GEOGRAPHIC AREA MAP

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nationalgrid



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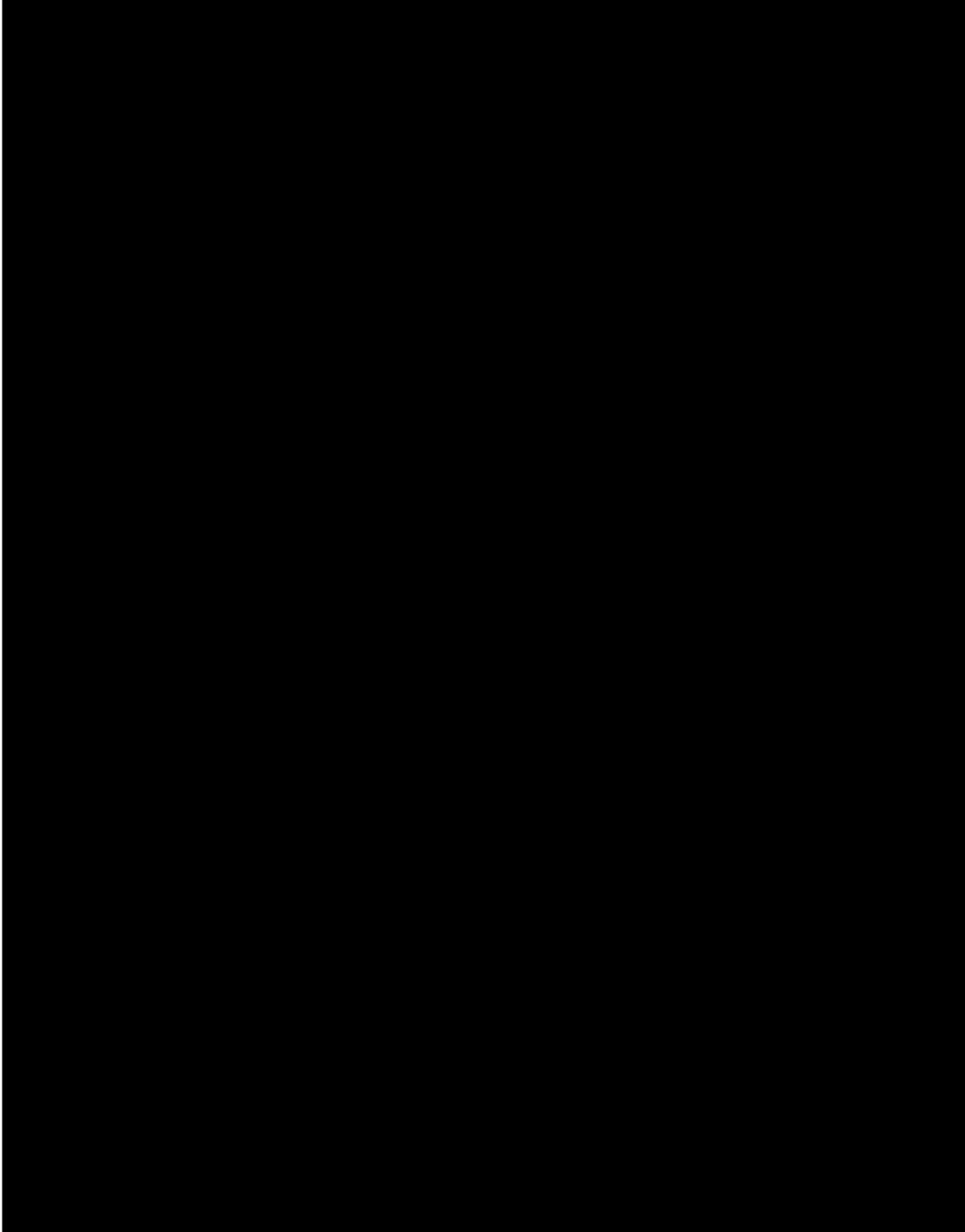


FIGURE 3 – EXISTING SUB-TRANSMISSION SYSTEM ONE-LINE DIAGRAM

US Sanction Paper

nationalgrid

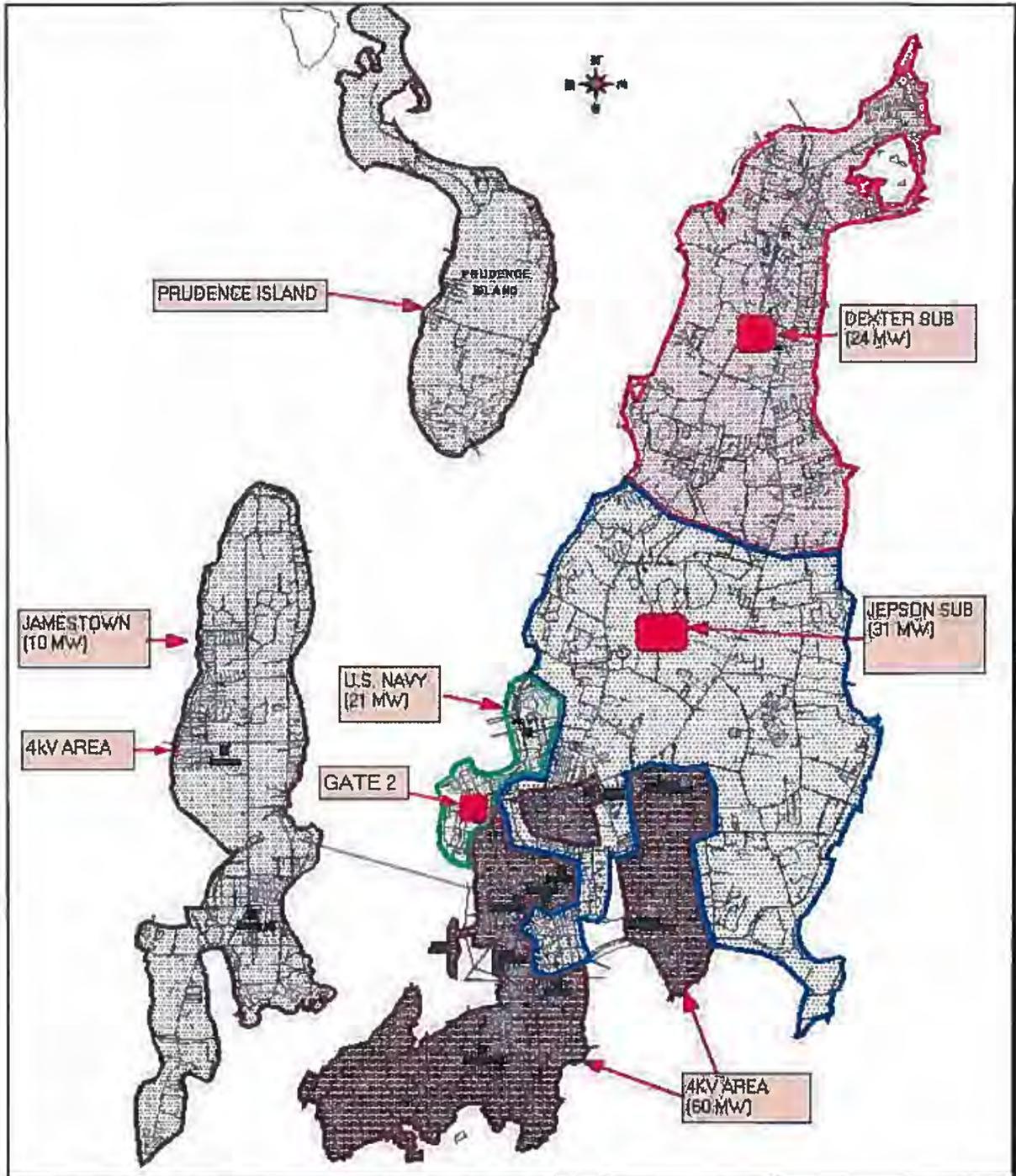


FIGURE 4 – GEOGRAPHIC MAP OF EXISTING DISTRIBUTION

US Sanction Paper

nationalgrid

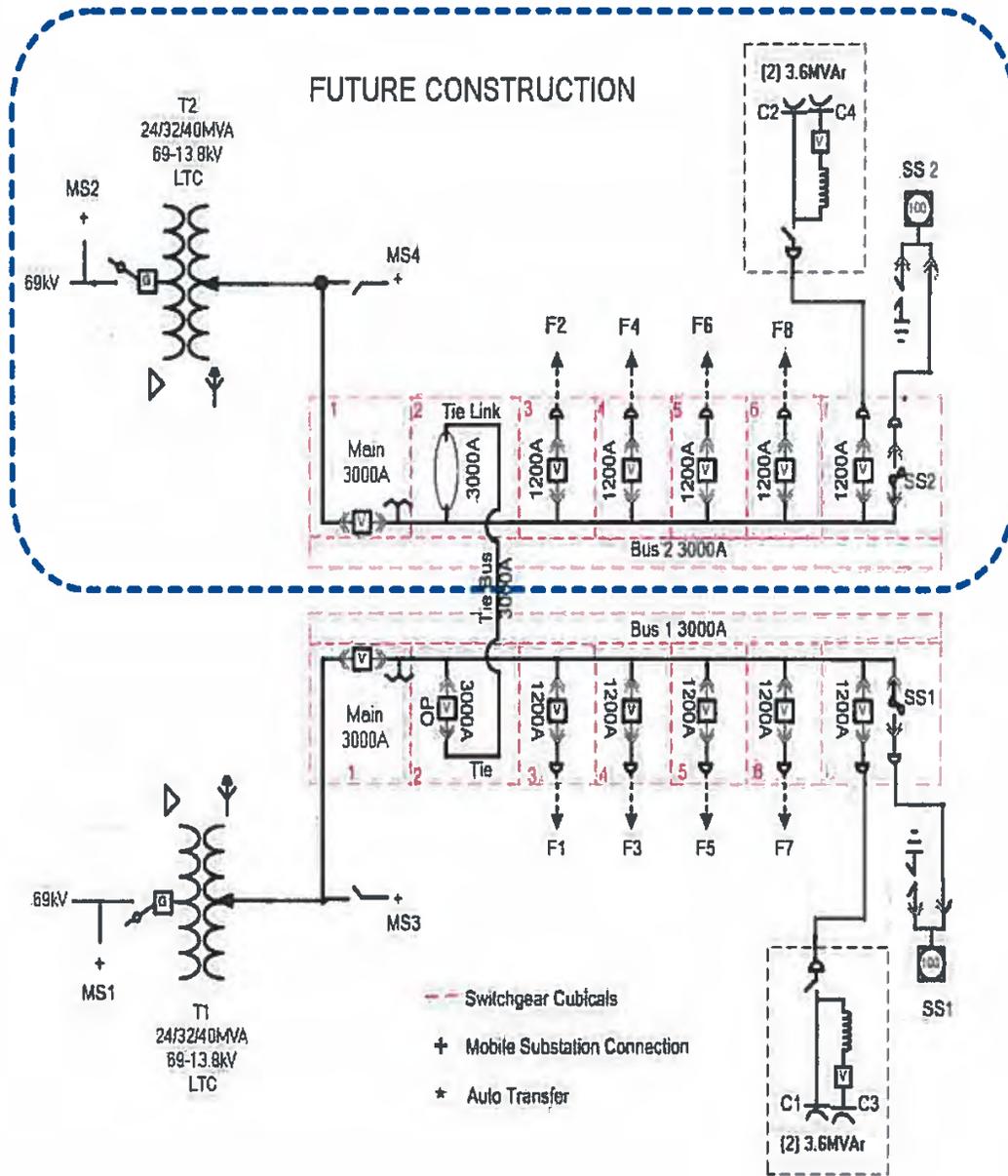


FIGURE 5 – NEWPORT 69/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

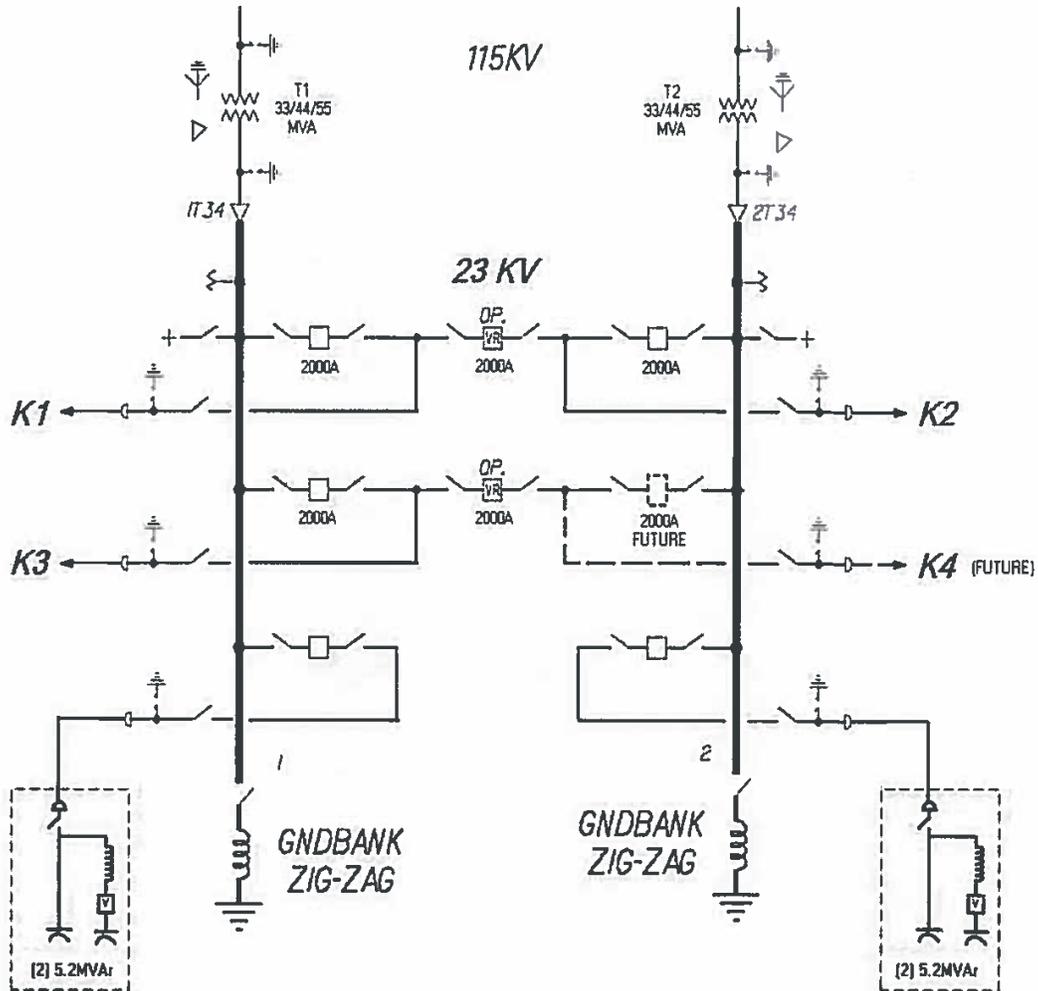


FIGURE 6 – MIDDLETOWN 115/23kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

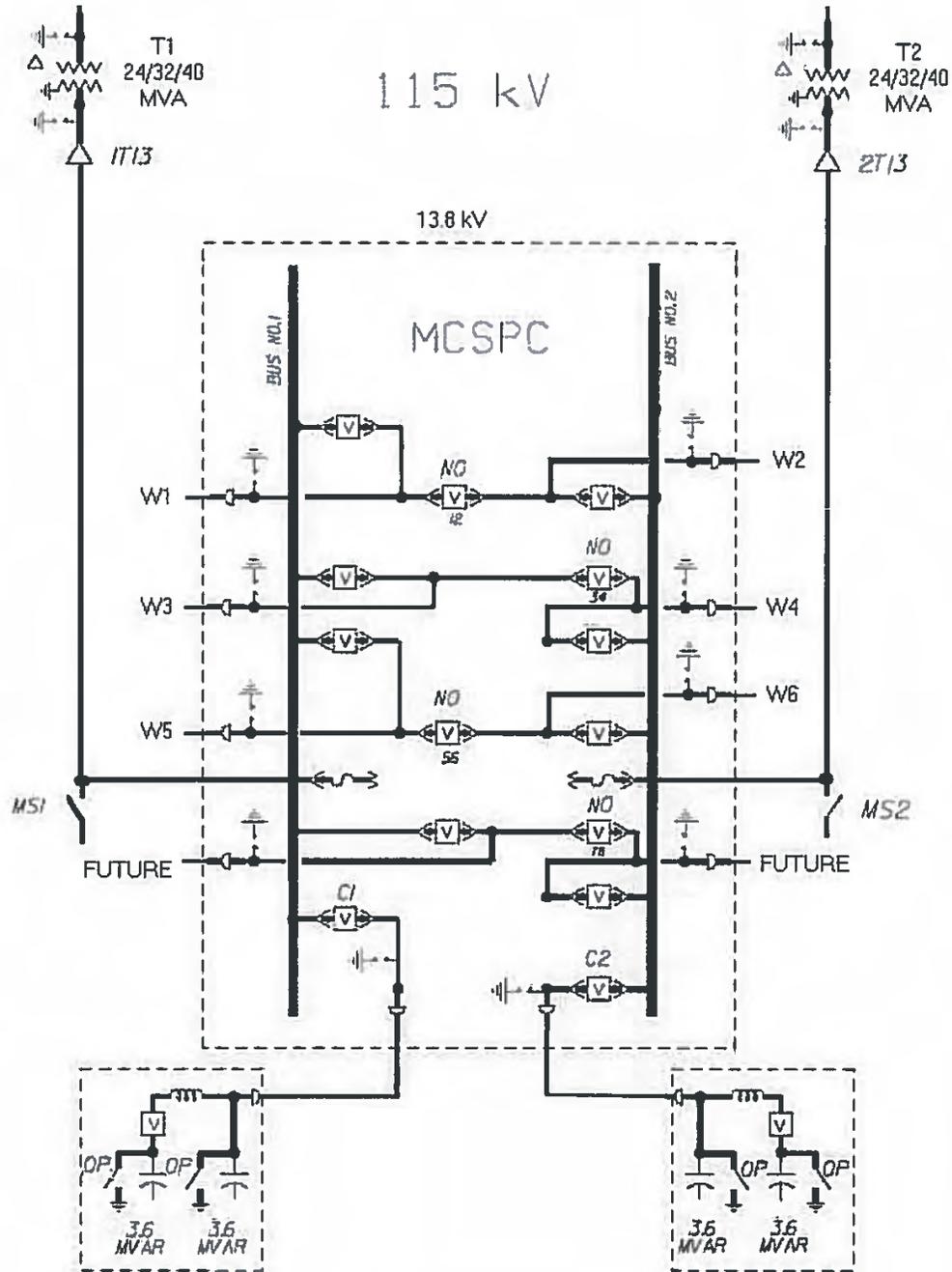


FIG 7 – MIDDLETOWN 115/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

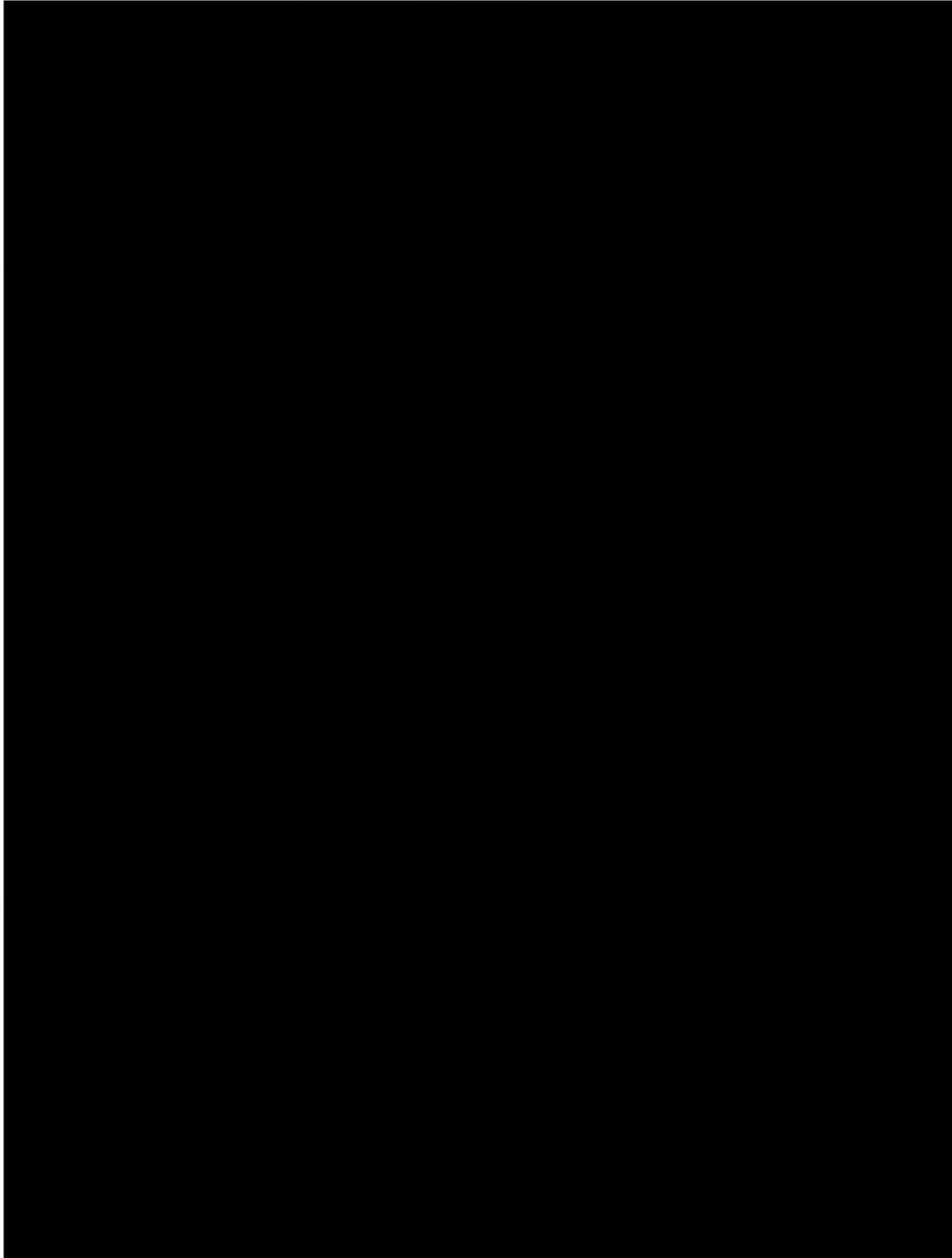


FIGURE 8 – PROPOSED STATION RETIREMENTS

US Sanction Paper

nationalgrid

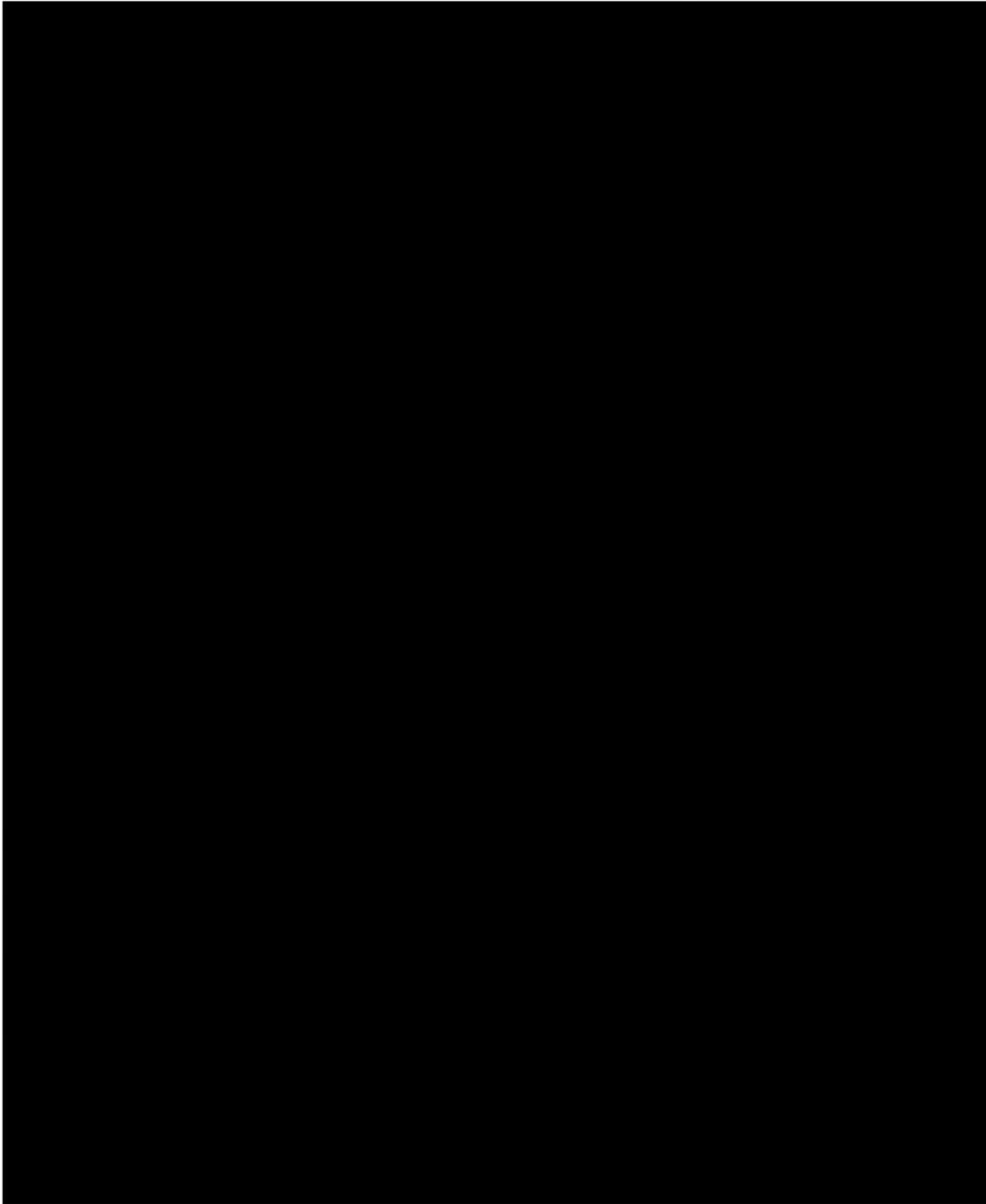


FIG 9 – PROPOSED SUBTRANSMISSION SYSTEM ONE-LINE

C028851

Recon. 38F5 and 2227 Greenville Ave

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|---------------------------------------|
| Fund Project Number: <u>C028851</u> | USSC #: |
| Revision: <u>6</u> | Budget Version: <u>Default</u> |
| Project Title: <u>Recon. 38F5 and 2227 Greenville Ave</u> | |
| Project Description: Reconductor the 2227 with 795 kmil AI and the 38F5 feeder with 477 kmil AI between P187 Greenville Ave and P.9396 and 38F5 between P9396 Greenville and P.171 Putnam Pike. | |

| | |
|---|---|
| Project Status: <u>Closed</u> | |
| Responsible Person: <u>CURLEY, JOSEPH</u> | Initiator: <u>Worme, Chris</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>27</u> | Project Complexity Score: <u>15</u> |

| <u>Project Schedule / Expenditures</u> | | | | | |
|---|-----------------------|---------------------------|-----------------------|---------------------|-----------------------|
| Revision Status: | <u>Approved</u> | | | | |
| Est Start Date: | <u>11/1/2009</u> | Est Complete Date: | <u>3/31/2014</u> | | |
| Est In-Service Date: | <u>6/1/2010</u> | | | | |
| TTD Actuals: | <u>\$899,905</u> | As Of: | <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$633,000</u> | <u>\$63,000</u> | <u>\$189,500</u> | <u>\$885,500</u> | <u>\$0</u> |

Justification / Risk Identification:
 The 2227 is located above the 38F5. The 38F5 consists of a mix of 1/0 and 4/0 AI in subject area.

Project Scope:
 <Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Revised Re-Sanction from \$295K to \$885,500 per Pat Cody. This project was approved for 295K in October 2012. The original estimate was for Design, Engineering, and projected cost for construction of this project. Based on design it has been determined that the job will cost 885K for the total project including construction. The following is a breakdown of costs for the project: 39K Design and Engineering, 445K labor and Labor Overheads, 140K materials and Material Overheads, 31K joint ownership, 44K transportation, and 186K removals. Reconnector the 2227 and 705 level at the 2255 feed with 477 level at between D407 Overhead and D2227 and 2255 between

Related Projects:

Project Number:

Project Name:

Approvals

| | | | |
|----------------|--------------------------------------|-------------------------------|-------------------|
| Line 1: | Date <u>5/7/2013 09:58:16</u> | Approver <u>sherir</u> | <u>Approver 1</u> |
| Line 2: | Date | Approver | |
| Line 3: | Date | Approver | |
| Line 4: | Date | Approver | |
| Line 5: | Date | Approver | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028851 Current Total Authorized Amount: \$885,000

Title: Recon. 38F5 and 2227 Greenville Ave
Project Number: C028851

Budget Version Default (active)
Revision:
Revision Status: Approved
Revision No.: 6
Est Start Date: 11/01/2009
Est Complete Date: 12/01/2010
Est In Srvc Date: 06/01/2010
Capital: \$633,000.00
Expense: \$63,000.00
Jobbing: \$0.00
Retirement: \$0.00
Removal: \$189,500.00
Total (excl. Rets.): \$885,500.00
Credits: \$0.00
Net: \$885,500.00

Revision Info: Other Updates

Revision: 6 of 7
Find Revision
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Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare
Record 1 of 1
Audits

Close

Project Re-Sanction Request

Date: 5/1/2013

Company: 49
PPM Project Id*: 03655 (C28851)
Project Name:
Recon. 38F5 and 2227 Greenville Ave, Johnston, RI
Project Engineer:

Project Manager: Pat Cody

Original Project Estimate:

Date of Original Sanction: 10/5/2012

Total: 295,000

Capex: 150,000

Opex: 130,000

Removal: 15,000

Revised Project Estimate:

Total: 885,500

Capex: 633,000

Opex: 63,000

Removal: 189,500

Cash Flows:

Previous FY: 885,500

Capex: 633,000

Opex: 63,000

Removal: 189,500

Current FY: 0

Capex:

Opex:

Removal:

FY+1: 0

Capex:

Opex:

Removal:

FY+2: 0

Capex:

Opex:

Removal:

Customer Contribution:

Reason for Revision

- Revised Forecast exceeds Approved Amount – Project Still In-Process
New Project Estimated Completion Date:
- Actual Spending exceeded Approved Amount – Project is Complete
- PPM (conversion issues)

Reason for Increased Spending:

- Change in Scope (Material, Labor or Other)

Reconductor the 2227 and 795 kcmil Al and the 38F5 feeder with 477 kcmil AL between P187 Greenville Ave and P.9396 and 38F5 between P.9396 Greenville and P.171 Putnam Pike. Upgraded construction grade estimate.

- Resource Allocation (Schedule, Delay, OT, or Contractor)

Low Estimate

This project was approved for 295K in October 2012. The original estimate was for Design, Engineering, and projected cost for construction of this project. Based on design it has been determined that the job will cost 885K for the total project including construction. The following is a breakdown of costs for the project: 39K Design and Engineering, 445K labor and Labor Overheads, 140K materials and Material Overheads, 31K joint ownership, 44K transportation, and 186K remove

External Forces (Permitting Requirements, Weather, Contractor Issues, etc)

project was delayed due to Verizon Pole sets

In-service Dates

Original In-service Date: 2/4/2013

Revised In-service Date: 2/5/2013

Reason for Change in Schedule:

Budget Deferral

Permitting/Licensing

Resource Availability

additional resources were available to assist Telco and project was completed ahead of schedule.

Deferral due to change in system conditions

Material Delay

Outage Scheduling

Other

Prior to May 2010 PPM Project Id represents the Power Plant funding number

C028884

Install Johnston 18F10 Feeder

5360-Narragansett Electric and Gas Project Revision Detail Report

| | | | |
|-----------------------------|--|------------------------|-------------------------|
| Fund Project Number: | <u>C028884</u> | USSC #: | <u>USSC0110W259 v3C</u> |
| Revision: | <u>10</u> | Budget Version: | |
| Project Title: | <u>Install Johnston 18F10 Feeder</u> | | |
| Project Description: | <u>Install a new feeder getaway at Johnston, construct approximately 4,200 ft of mainline and rearrange the area distribution.</u> | | |

| | | | |
|-----------------------------|--|----------------------------------|--|
| Project Status: | <u>Closed</u> | | |
| Responsible Person: | <u>HURLEY, KATHLEEN</u> | Initiator: | <u>Worme, Chris</u> |
| Spending Rationale: | <u>System Capacity & Performance</u> | Funding Type: | <u>P Electric Distribution Line RI</u> |
| Budget Class: | <u>Load Relief</u> | | |
| Capital by Category: | | | |
| Program Code: | | | |
| Project Risk Score: | <u>35</u> | Project Complexity Score: | <u>23</u> |

Project Schedule / Expenditures

| | | | | | |
|-----------------------------|-----------------------|---------------------------|-----------------------|---------------------|-----------------------|
| Revision Status: | <u>Approved</u> | | | | |
| Est Start Date: | <u>5/20/2010</u> | Est Complete Date: | <u>9/30/2015</u> | | |
| Est In-Service Date: | <u>9/30/2015</u> | | | | |
| TTD Actuals: | <u>\$1,078,185</u> | As Of: | <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$848,000</u> | <u>\$67,000</u> | <u>\$164,000</u> | <u>\$1,079,000</u> | <u>\$0</u> |

Justification / Risk Identification:

This project covers the preliminary engineering associated with this project. The DOA dollars were reallocated 2-26-2010 based upon DCIG strategy paper. The three Johnston feeders supplying load west of the station, 18F1, 18F3 and 18F7, are projected at 111%, 90% and 100% in 2011 and 115%, 94% and 104% of summer normal ratings by 2012. Load in this area is expected to continue to increase with the continued development of the industrial park on Scituate Ave. These feeders have ties to the West Cranston feeder 21F2 with a projected load of 64% of rating in 2011. Scituate load between these feeders is not expected to relieve the

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Total DOA \$0.695M over 4 projects 4443, 3435, 4415 and DxT 4442.

USSC0110W259 v2: C036072 \$1.000M; C033535 \$290K; C034002 \$260K; C028884 \$720K.

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|---------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>1/28/2017 18:27:21</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 226 of 889

PowerPlan ----- PPGPRD Database

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Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028884 Current Total Authorized Amount: \$1,07...

Title: Install Johnston 18F10 Feeder
Project Number: C028884

| | |
|----------------------------|-----------------------|
| Budget Version | Default (active) |
| Revision | v3 |
| Revision Status | Approved |
| Revision No. | 9 |
| Est Start Date | 05/20/2010 |
| Est Complete Date | 09/30/2015 |
| Est In Srvc Date | 09/30/2015 |
| Capital | \$848,000.00 |
| Expense | \$67,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$163,000.00 |
| Total (excl. Rets.) | \$1,078,000.00 |
| Credits | \$0.00 |
| Net | \$1,078,000.00 |

Revision Info: Other Updates

Revision: 9 of 10 [K] [<] [>] [>I]
[Find Revision](#) [Send for Approval]

Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
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Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare [Close]

Record 1 of 1 [K] [<] [>] [>I]

Audits

This document has been reviewed for Critical Energy Infrastructure Information (CEII). 1/26/2017



USSC Closure Paper

| | | | |
|---------------------------|---------------------------------------|--------------------------|---|
| Title: | Johnston #18 Substation | Sanction Paper #: | USSC0110W259 v3C |
| Project #: | C033535, C034002, C028884, C036072 | Sanction Type: | Closure |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | January 11, 2017 |
| Author: | Kathleen Hurley | Sponsor: | Carol Sedewitz, VP Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Kathleen Hurley |

1 Executive Summary

This paper is presented to close the Johnston #18 Substation Project, the funding numbers consists of: C033535, C034002, C028884 and C036072. The total spend was \$8.203M. The latest sanctioned amount for this project was \$8.138M.

The original requested sanction amount was \$7.345M.

The final spend amount is \$8.203M broken down into:

- \$6.515M Capex
- \$0.078M Opex
- \$0.752M Removal

2 Project Summary

This project replaced the No. 3 Transformer at the Johnston Substation, installed three feeder positions and retired and removed all equipment in the old 12.47 kV substation.

The project consisted of the following activities:

- Completed a 3rd bay by adding a second feeder position, this consisted of a feeder breaker, regulators, switches, relays, control and other associated equipment.
- Added a 4th and 5th bay consisting of a tie breaker and two feeder positions.
- Added two substation capacitor banks.
- Installed the underground ducts and cables to the new feeder position.
- Replaced the existing No.3 Transformer with a newer unit rated at 33/44/55 MVA.
- Retired and removed all equipment in the old 12.47 kV substation.

USSC Closure Paper



3 Over / Under Expenditure Analysis

3.1 Summary Table

| Actual Spending (\$M) | | | |
|-----------------------|---|--------------|--------------------|
| Project # | Description | | Total Spend |
| C033535 | Johnston Substation Work and Retirement of the old Substation | Capex | 4.579 |
| | | Opex | 0.010 |
| | | Removal | 0.200 |
| | | Total | 4.789 |
| Project # | Description | | Total Spend |
| C034002 | Johnston Sub 12kV Expansion Getaways | Capex | 0.317 |
| | | Opex | 0.007 |
| | | Removal | 0.016 |
| | | Total | 0.340 |
| Project # | Description | | Total Spend |
| C028884 | Johnston 18F10 Feeder Installation | Capex | 0.848 |
| | | Opex | 0.067 |
| | | Removal | 0.164 |
| | | Total | 1.079 |
| Project # | Description | | Total Spend |
| C036072 | Johnson T#3 Replacement | Capex | 1.989 |
| | | Opex | 0.005 |
| | | Removal | 0.001 |
| | | Total | 1.995 |
| Total | | Capex | 7.733 |
| | | Opex | 0.089 |
| | | Removal | 0.381 |
| | | Total | 8.203 |



USSC Closure Paper

| Project Sanction Summary Table | | | |
|--|--|-----------------------|--------------------|
| Project Sanction Approval (\$M) | | | Total Spend |
| | | Capex | 6.515 |
| | | Opex | 0.078 |
| | | Removal | 0.752 |
| | | Total Cost | 7.345 |
| Sanction Variance (\$M) | | | Total Spend |
| | | Capex | (1.218) |
| | | Opex | (0.011) |
| | | Removal | 0.371 |
| | | Total Variance | (0.858) |

3.2 Analysis

The original design called for removing all protection on the 13kV tertiary winding because all load was being removed from that winding. However, because it is a delta winding, a ground fault protection was required to detect ground faults on the 13kV winding.

This issue was caught in the field, reviewed by the team and was added to the scope after the design and estimate had been approved. A PCR was created for this change.

4 Improvements / Lessons Learned

Lessons Learned: The original design called for removing all protection on the 13kV tertiary winding because all load was being removed from that winding. However, because it is a delta winding, ground fault protection was required. This issue was caught in the field, reviewed by the team and added to the scope after the design and estimate had been approved.

A thorough design review including input from all team members should be held prior to issuing for construction to prevent any potential design work from being overlooked or omitted prior to the construction phase.

Please refer to ID #480 in the Lessons Learned Database.

5 Closeout Activities

The following closeout activities have been completed.

| Activity | Completed |
|---|--|
| All work has been completed in accordance with all National Grid policies | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |



USSC Closure Paper

| | |
|--|--|
| All relevant costs have been charged to project | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All work orders and funding projects have been closed | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All unused materials have been returned | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All as-builts have been completed | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |
| All lessons learned have been entered appropriately into the lesson learned database | <input checked="" type="radio"/> Yes <input type="radio"/> N/A |

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Department | Individual | Responsibilities |
|-----------------------------|------------------------------------|---|
| Investment Planning | DiConza, Glen/ Park, Michelle | Endorses relative to 5-year business plan or emergent work |
| Resource Planning | Wyman, Anne/ Philips, Mark | Endorses construction resources, cost estimate, schedule, and portfolio alignment |
| Asset Management / Planning | Hayduk, Brian/ Labarre, Alan T. | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Engineering and Design | Martuscello, Suzan E. | Endorses scope, design, conformance with design standards |
| Project Management | Schneller, Andrew | Endorses resources, cost estimate, schedule |
| Electric Project Estimation | Simonds, Jammie | Endorses Cost Estimate |

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|------------|---------------------------------|
| Finance | Easterly Patricia/Helm, Richard |
| Regulatory | Zschokke, Peter |

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| | |
|----------------------------|------------------------------------|
| Jurisdictional Delegate(s) | Patterson Jim/ Terron Hill |
| Procurement | Curran, Art |
| Control Centers (CC) | Gallagher Michael Houston, Will |

USSC Closure Paper



7 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on January 11, 2017.

Signature..... *Ch. K.*Date..... *1/23/17*

Christopher Kelly
Acting Senior Vice President Electric Process and Engineering

C028920

New London Ave (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

| | | | |
|-----------------------------|---|------------------------|--------------------------------|
| Fund Project Number: | <u>C028920</u> | USSC #: | <u>USSC-12-472v2 (DCIG100)</u> |
| Revision: | <u>7</u> | Budget Version: | <u>Default</u> |
| Project Title: | <u>New London Ave (D-Sub)</u> | | |
| Project Description: | This project recommends the installation of a new 115/12.47kV metal-clad substation near New London Turnpike with a single transformer, 3000 A bus, four 12.47kV distribution feeders and capacitor bank. | | |

| | | | |
|-----------------------------|--|----------------------------------|---------------------------------------|
| Project Status: | <u>open</u> | | |
| Responsible Person: | <u>HURLEY, KATHLEEN</u> | Initiator: | <u>Worme, Chris</u> |
| Spending Rationale: | <u>System Capacity & Performance</u> | Funding Type: | <u>P Electric Distribution Sub RI</u> |
| Budget Class: | <u>Load Relief</u> | | |
| Capital by Category: | | | |
| Program Code: | | | |
| Project Risk Score: | <u>39</u> | Project Complexity Score: | <u>29</u> |

Project Schedule / Expenditures

| | | | | | |
|-----------------------------|-----------------------|---------------------------|-----------------------|---------------------|-----------------------|
| Revision Status: | <u>Approved</u> | | | | |
| Est Start Date: | <u>4/21/2009</u> | Est Complete Date: | <u>2/28/2017</u> | | |
| Est In-Service Date: | <u>12/31/2016</u> | | | | |
| TTD Actuals: | <u>\$2,907,244</u> | As Of: | <u>10/2/2017</u> | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$2,525,000</u> | <u>\$18,000</u> | <u>\$0</u> | <u>\$2,543,000</u> | <u>\$0</u> |

Justification / Risk Identification:

This project recommends the installation of a new 115/12.47kV metal-clad substation near New London Turnpike with a single transformer, 3000 A bus, four 12.47kV distribution feeders and capacitor bank.

Project Scope:

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings

Project Alternatives Considered:

<Enter data here>

Additional Notes:

USSC-12-472 Partial Sanction total DoA \$770K. C031696 \$100K; C028920 \$250K; C028921 \$250K; C045313 \$75K; C030161 \$70K; C030161 \$25K

Related Projects:

Project Number:

C045313

Project Name:

New London WaveTrap

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>6/9/2014 14:41:13</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028920 Current Total Authorized Amount: \$2,54...

Title

Project Number

| | |
|----------------------------|--------------------------------|
| Budget Version | Default (active) |
| Revision | 12-472 v2 |
| Revision Status | Approved |
| Revision No. | <input type="text" value="7"/> |
| Est Start Date | 04/21/2009 |
| Est Complete Date | 02/28/2017 |
| Est In Srvc Date | 12/31/2016 |
| Capital | \$2,525,000.00 |
| Expense | \$18,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$0.00 |
| Total (excl. Rets.) | \$2,543,000.00 |
| Credits | \$0.00 |
| Net | \$2,543,000.00 |

Revision Info

Revision of 7

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been reviewed for Critical Energy Infrastructure Information (CEII)

D+T



US Sanction Paper

| | | | |
|---------------------------|--|--------------------------|---|
| Title: | New London Avenue Substation #150 | Sanction Paper #: | USSC-12-472 v2 |
| Project #: | C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 5/14/14 |
| Author: | Marc Bristol | Sponsor: | Cheryl A. Warren, Vice President Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Marc Bristol |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of projects C028920, C031696, C028921, C030161, C054764, C045313, C054434, and C054436 in the amount \$12.600M with a tolerance of +/- 10% for the purposes of final engineering and design, procurement of long lead materials, and initial construction activities.

This sanction amount is \$12.600M broken down into:

- \$10.490 Capex
- \$0.372 Opex
- \$1.729 Removal

NOTE the potential investment of \$18.600M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

1.2 Project Summary

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings.

The station will be located between West Cranston #21 and Drumrock #14 substations and supplied by a 115kV tap from the existing T-172S transmission line.

The station will be located on a purchased parcel of land adjacent to another company-owned parcel on New London Avenue.



US Sanction Paper

1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---|-----------------------|
| C028920 | Distribution Substation | New London Ave Substation | 6.778 |
| C031696 | Transmission Line | T172S Line Tap | 2.026 |
| C028921 | Distribution Line | Distribution Getaways and 4kV Conversions | 8.613 |
| C030161 | Transmission (SubT-Line) | 3310 Reconductoring | 0.650 |
| C054764 | Transmission (SubT-Line) | 3311 Upgrades | 0.059 |
| C045313 | Transmission Substation | New London Ave Circuit Switcher and Wave Trap | 0.182 |
| C054434 | Transmission | W Cranston Substation- Install Wave Trap | 0.150 |
| C054436 | Transmission | Johnston Substation - Install Wave Trap | 0.150 |
| Total | | | 18.608 |

1.4 Associated Projects

| Project Number | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------------------|-----------------------|
| C053723 | Arctic Substation Retirement (D-Sub) | 0.250 |
| Total | | 0.250 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Paper Title | Sanction Type |
|------------|---------------------|-------------------|---|---------------|
| 12/12/2012 | USSC USSC-12-472 | \$0.770M | New London Ave Substation #150 | Partial |
| 06/30/2009 | AMIC SG114 | \$0.00M | Strategy to Build a 115/12.5kV Substation in West Warwick, RI | Strategy |
| 06/18/2009 | AMIC PWS0922 | \$0.175M | A New 115/12.5kV Substation in West Warwick RI | Partial |
| 10/01/2008 | DCIG DCIG1008P92 | \$0.365M | West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines | Partial |

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|----------------------------|
| July 2015 | Full implementation |



US Sanction Paper

1.7 Category

| Category | Reference to Mandate, Policy, or NPV Assumptions |
|---|---|
| <input type="radio"/> Mandatory <input checked="" type="radio"/> Policy- Driven <input type="radio"/> Justified NPV | The investment has been classified as policy driven. Without this project the company will not be able to provide a reliable electric service to the customers in the study area. |

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 29

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--|---|--|--|
| New England Distribution FY15-FY19 C028920, C028921, | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$9.300M |
| New England Transmission FY15-FY19 C031696, C045313, C054434, C054436, C030161, C054764 | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.830M |

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

| \$M | Prior Yrs | Current Planning Horizon | | | | | | Total |
|--------------------|--------------|--------------------------|------------------|------------------|------------------|------------------|-------------------|---------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6+ 2019/20 | |
| CapEx | 0.679 | 2.443 | 6.301 | 7.002 | 0.000 | 0.000 | 0.000 | 16.425 |
| OpEx | 0.019 | 0.063 | 0.244 | 0.085 | 0.000 | 0.000 | 0.000 | 0.411 |
| Removal | 0.002 | 0.273 | 1.100 | 0.397 | 0.000 | 0.000 | 0.000 | 1.772 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 0.700 | 2.779 | 7.645 | 7.484 | 0.000 | 0.000 | 0.000 | 18.608 |



US Sanction Paper

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Start Preliminary Engineering (kick-off meeting) | May 2009 |
| Partial Sanction | May 2014 |
| Distribution Line Design Complete – EDC | July 2014 |
| Distribution Line Construction Start | December 2014 |
| Substation Engineering Design Complete – EDC | May 2015 |
| Project Sanction | August 2015 |
| Substation Construction Start | October 2015 |
| Submit Facility Ratings to ISO | July 2016 |
| Substation Construction Complete – CC | November 2016 |
| Ready for Load - RFL | November 2016 |
| Distribution Line Construction Complete – CC | December 2016 |
| Project Closure Report | February 2017 |

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|--|
| 1 | Special use permit from the City of Warwick required |
| 2 | Outage required on the T172S for new 115kV tap; summer outage should be avoided |
| 3 | Historical raw material found on site, additional site exploration required for characterization |



US Sanction Paper

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |

1.18 List References

| | |
|---|--|
| 1 | USSC-12-472 – New London Ave Substation #150 December 2012 |
| 2 | SG114 - Strategy to Build a 115/12.5kV Substation in West Warwick, RI June 2009 |
| 3 | PWS0922 - A New 115/12.5kV Substation in West Warwick RI June 2009 |
| 4 | DCIG1008P92 – West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines May 2009 |



US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on May 14, 2014:

(a) APPROVED the investment of \$12.600M and a tolerance of +/- 10% for final engineering and design, procurement of long lead materials, and initial construction activities.

(b) NOTED the potential investment \$18.600M to and a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Marc Bristol has the approved financial delegation to undertake the activities stated in (a).

Signature  Date 

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

| | | | |
|---------------------------|--|--------------------------|------------------|
| Title: | New London Avenue Substation #150 | Sanction Paper #: | USSC-12-472 v2 |
| Project #: | C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 5/14/14 |
| Author: | Marc Bristol | Sponsor: | Cheryl A. Warren |
| Utility Service: | Electricity T&D | Project Manager: | Marc Bristol |

3.1 *Background*

The Central Rhode Island West study area encompasses the Towns of Coventry, West Greenwich, and West Warwick and sections of the Cities of Cranston and Warwick, and Towns of East Greenwich, Exeter, and Scituate. The area load peaked at approximately 169 MVA in 2012 with 47,000 customers served. The study area and existing area substations are shown in Figure 1 of the appendix.

In 2008 a comprehensive study was completed for this area. This study identified an immediate need for new distribution capacity in the area to resolve short-term loading concerns and a new substation in the Warwick/West Warwick area to resolve long-term loading concerns and significant exposure for various n-1 contingencies. The 2012 Annual Capacity Plan still supports the need for a new substation in this area.

The Central Rhode Island West study area is still supplied by a highly utilized supply and distribution system. It is becoming increasingly challenging to operate this system within normal loading limits and to supply load growth in this area. This strategy paper documents the long-term solution for the area.

3.2 *Drivers*

The primary driver is projected thermal overloads of transformers, distribution feeders and supply lines during period of system peak loading. There have been a number of large developments in the area such as The Centre of New England and the Royal Mills complex that continue to add load to an area with heavily loaded feeders and supply lines. A new modular feeder along with load transfers have been utilized to prevent thermal overloads as a result of the new load.

The tables below show the facilities in the study area that are projected to exceed 100% of their rating during either normal operation or contingencies. Table 1 below shows feeders in the area with loads projected to exceed 100% of their normal rating; Table 2 shows transformers with loads projected to exceed 100% of their normal rating; and Table 3 shows the supply lines that are overloaded during contingencies.



US Sanction Paper

| Substation | Feeder | SN Rating (Amps) | 2014 | | 2016 | | 2018 | | 2020 | |
|--------------|--------|------------------|------|------|------|------|------|------|------|------|
| | | | Amps | %SN | Amps | %SN | Amps | %SN | Amps | %SN |
| ANTHONY | 64F1 | 361 | 336 | 93% | 353 | 98% | 359 | 99% | 363 | 101% |
| ANTHONY | 64F2 | 361 | 344 | 95% | 361 | 100% | 367 | 102% | 372 | 103% |
| HOPE | 15F2 | 476 | 465 | 98% | 487 | 102% | 496 | 104% | 502 | 105% |
| HOPKINS HILL | 63F2 | 530 | 512 | 97% | 537 | 101% | 546 | 103% | 553 | 104% |
| KENT COUNTY | 22F3 | 530 | 487 | 92% | 511 | 96% | 520 | 98% | 527 | 99% |
| KENT COUNTY | 22F4 | 586 | 579 | 99% | 607 | 104% | 618 | 105% | 626 | 107% |
| ARCTIC | 49J4 | 295 | 294 | 100% | 308 | 104% | 313 | 106% | 317 | 108% |

Table 1 - Projected loads through 2020 for feeders and loads greater than 100%

| Substation | Transformer | 2014 | | 2016 | | 2018 | | 2020 | |
|------------|-------------|------|------|------|------|------|------|------|------|
| | | MVA | % SN |
| ANTHONY | 1 | 7.3 | 93% | 7.6 | 98% | 7.7 | 99% | 7.8 | 101% |
| ANTHONY | 2 | 7.4 | 95% | 7.8 | 100% | 7.9 | 102% | 8.0 | 103% |

Table 2 - Projected Loads through 2020 for Transformers with Loads Greater than 100%

| Circuit | Line Section | | 2014 | | 2016 | | 2018 | | 2020 | |
|---------|---------------------|--------------------|--------------|------|------|------|------|------|------|------|
| | From | To | MVA | % SE | MVA | % SE | MVA | % SE | MVA | % SE |
| | 2230 | Natick 29 Tap | Artic 49 Tap | 37.5 | 106% | 39.3 | 111% | 40.0 | 113% | 40.5 |
| 2230 | Warwick Mall 28 Tap | Natick 29 | 16.1 | 105% | 16.9 | 110% | 17.2 | 112% | 17.4 | 113% |
| 2232 | Anthony Tap | Coventry Tap | 16.0 | 104% | 16.8 | 110% | 17.1 | 112% | 17.3 | 113% |
| 3310 | Kent County 22 | Major Potter Rd | | | | | | | | |
| 3310 | Major Potter Rd | Hopkins Hill Riser | | | | | | | | |
| 3311 | Kent County 22 | Hopkins Hill Tap | | | | | | | | |
| 3311 | Hopkins Hill Tap | Hopkins Hill 63 | | | | | | | | |

Table 3 - Projected Contingency Loads through 2020 for Supply Line Segments with Loads Greater than 100%

The tables below show projected loading after the New London Ave substation is placed in service. Table 4 below shows projected feeder loading; Table 5 below shows projected transformer loading; and Table 6 below shows projected supply line loading post an n-1 contingency.



US Sanction Paper

| Substation | Feeder | SN Rating (Amps) | 2014 | | 2016 | | 2018 | | 2020 | |
|--------------|--------|------------------------|------|------|------|-----|------|------|------|------|
| | | | Amps | %SN | Amps | %SN | Amps | %SN | Amps | %SN |
| ANTHONY | 64F1 | 361 | 355 | 98% | 304 | 84% | 317 | 88% | 329 | 91% |
| ANTHONY | 64F2 | 361 | 363 | 101% | 313 | 87% | 327 | 91% | 339 | 94% |
| HOPE | 15F2 | 476 | 529 | 111% | 402 | 84% | 419 | 88% | 435 | 91% |
| HOPKINS HILL | 63F2 | 530 | 536 | 101% | 515 | 97% | 537 | 101% | 558 | 105% |
| KENT COUNTY | 22F3 | 530 | 547 | 103% | 289 | 54% | 301 | 57% | 313 | 59% |
| KENT COUNTY | 22F4 | 586 | 580 | 99% | 555 | 95% | 579 | 99% | 601 | 103% |
| ARCTIC | 49J4 | 452 | 317 | 70% | 274 | 61% | 285 | 63% | 296 | 66% |
| WEST WARWICK | F1 | | | | 455 | 71% | 474 | 74% | 493 | 76% |
| WEST WARWICK | F2 | | | | 347 | 66% | 362 | 68% | 376 | 71% |
| WEST WARWICK | F3 | | | | 309 | 58% | 322 | 61% | 334 | 63% |
| WEST WARWICK | F4 | | | | 327 | 51% | 341 | 53% | 354 | 55% |

Table 4 - Project Loads through 2020 for Feeders Post New London Ave Substation

| Substation | Tranf. ID. | 2016 | | 2018 | | 2020 | |
|------------|------------|------|------|------|------|------|------|
| | | MVA | % SN | MVA | % SN | MVA | % SN |
| ANTHONY | 1 | 6.6 | 84% | 6.8 | 88% | 7.1 | 91% |
| ANTHONY | 2 | 6.8 | 87% | 7.1 | 90% | 7.3 | 94% |

Table 5 - Project Loads through 2020 for Transformers Post New London Ave Substation

| Circuit | Line Section | | 2016 | | 2018 | | 2020 | |
|---------|---------------------|--------------------|------|---------------|--------------|------|------|------|
| | From | To | MVA | % SE | MVA | % SE | MVA | % SE |
| | | | 2230 | Natick 29 Tap | Artic 49 Tap | 33.6 | 95% | 34.2 |
| 2230 | Warwick Mall 28 Tap | Natick 29 | 15.3 | 100% | 15.6 | 102% | 15.8 | 103% |
| 2232 | Anthony Tap | Coventry Tap | 14.8 | 96% | 15.0 | 98% | 15.2 | 99% |
| 3310 | Kent County 22 | Major Potter Rd | | | | | | |
| 3310 | Major Potter Rd | Hopkins Hill Riser | | | | | | |
| 3311 | Kent County 22 | Hopkins Hill Tap | | | | | | |
| 3311 | Hopkins Hill Tap | Hopkins Hill 63 | | | | | | |

Table 6 - Projected Contingency Loads through 2020 for Supply Line Segments Post New London Ave Substation



US Sanction Paper

3.3 Project Description

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. The station will be located adjacent to the transmission corridor between West Cranston and Drumrock substations and supplied by a 115 kV tap from an existing transmission line. The proposed geographical location of the proposed new substation is shown in Figure 2, and proposed one line shown in Figure 3 of the appendix.

Initially, four 12.47 kV feeders will be installed through approximately 2500 ft manhole and duct system, and the existing distribution system will be rearranged to offload existing transformers, supply lines and distribution feeders. The new feeders will supply load currently fed from the four 4kV Arctic substation feeders, these circuits will be converted to 12.47 kV and the substation retired under associated project funding number C053723.

The layout of the 12.47 kV distribution feeders, after installation of the substation is shown in Figure 5 of the appendix.

There are two sections of the 3310 and 3311 supply lines that are projected to be overloaded on contingency after the new station is in service. These lines are classified as transmission assets. The estimated cost of reconductoring approximately 5,000 ft of the 3310 line to eliminate the overloads is estimated at \$650,000 and the cost of upgrading the 3311 for 120°C operation is \$20,000. The alternative to the reconductoring and upgrading these lines is to remotely drop a feeder at Hopkins Hill substation on supply line contingency. It is recommended that these two circuits be upgraded.

Simulation results indicate that the addition of the New London Ave substation and 0.04 mile transmission tap would result in unacceptable attenuation of the 240 kHz power line carrier (PLC) signal. Acceptable channel performance will be achieved by installing wave traps at New London Ave, Johnston, and West Cranston substations.

3.4 Benefits Summary

Relief of the customer's (Narragansett Electric Company) potential distribution loading issues and improving the reliability of the distribution supply system in the Central Rhode Island West area are the primary benefits of this project.

3.5 Business and Customer Issues

The land purchase was completed as of August 28, 2013.

3.6 Alternatives

Alternative 1: Expansion of West Cranston and Kent County substations

One alternative involved the expansion of existing 115/12.47kV substations at West Cranston and Kent and Kent County substations. The supply lines would have to be rebuilt for a larger capacity to accommodate two new modular stations in West Warwick and Coventry. It will be necessary to procure sites with the appropriate zoning for each station. The distribution system



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will be modified to accommodate the new stations. The estimated distribution cost of this option is \$11,300,000. There will be an additional \$3,800,000 in associated transmission costs. This option exceeded the cost of the preferred option; there are no additional benefits; and the uncertainty of finding appropriate lots make this option unattractive at this time.

Alternative 2: New 115/12.47kV substation in Cranston

A second alternative considered was the development of a new 115/12.47kV metal clad station on a site in Cranston near Phenix Avenue. The transmission costs are similar to the preferred plan, however, the distribution costs to extend feeders from this site to relieve the overloaded feeders and supply lines would be significantly more due to the limited routes available and the distance from the overloaded facilities. The detail of this option were not fully developed as the estimated distribution costs far exceeded those of the preferred alternative which was near the stations with loading issues. This option is also not recommended at this time.

3.7 Safety, Environmental and Project Planning Issues

Safety

All National Grid safety procedures will be followed at the site. This is a green field site and the majority of the work can be done before the station is energized. Clearances to live equipment must be maintained.

The equipment and fencing yard will be dimensioned to allow safe access around the yard for O&M equipment.

A secondary gate, remote from the primary yard entrance, will be provided for emergency egress from the yard.

The new Metal-Clad Switchgear Power Center (MCSPC) is designed with the switchgear in one room and the control switchboards in another to minimize personnel exposure to unsafe conditions. A door is provided between the two rooms as added protection from a fault in the switchgear area entering unimpeded into the control area.

Protective relays and controls will not be installed on the doors of the switchgear to eliminate potential personnel exposure to an arc fault condition while performing control or maintenance activities.

Environmental

As part of the due diligence process, a Phase 1 Environmental Site Assessment (ESA) was conducted with no Recognizable Environmental Conditions (RECs) found.

An Archaeological site review identified historical raw materials within the bounds of the proposed substation. A Phase 2 Archaeological site evaluation will be performed for characterization.

A Storm Water Pollution Prevention Plan (SWPPP) will be required.



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The land parcel has several wetlands. It is likely that the Rhode Island Department of Environmental Management (RIDEM) freshwater wetlands permitting will be required.

A Soil Erosion and Sediment Control Plan may be required by the City of Warwick.

Planning

A special use permit will be required to use the property for a substation. As part of that permit, requirements for fencing, driveways, landscape and screening, and setbacks must be met, or variances applied for and obtained.

The level of Stakeholder Management involvement is high as a result of proximity to abutters. The team will meet with the City of Warwick and abutters after site plans are finalized. The site design shall attempt to maintain natural screening to the residential abutters and landscaping will be provided to enhance the natural screening.

A noise study is being performed using the assumptions of 67 dBA NEMA low noise or 65 dBA very low noise to limit noise increases at nearby residences to 5 dBA or less.

3.8 Execution Risk Appraisal

| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Pre-Trigger Mitigation Plan | Residual Risk | Post Trigger Mitigation Plan |
|--------|---|-------------|--------|----------|-------|----------|----------|---|---------------|---|
| | | | Cost | Schedule | Cost | Schedule | | | | |
| 1 | Wetlands mitigation required by agencies may be greater than anticipated | 3 | 2 | 4 | 6 | 12 | Accept | Begin permitting process as early as possible to quantify risk and develop mitigation plans and designs | N/A | Address with offsets |
| 2 | Data recovery may be required for historical raw material found on site | 4 | 2 | 3 | 8 | 12 | Accept | Perform Phase 2 Archaeological site evaluation for characterization | N/A | Perform Data Recovery of material |
| 3 | Abutters views of substation, T-line construction could cause delays | 3 | 2 | 1 | 6 | | Accept | Initiate outreach plan early | N/A | Address identified abutter issues with potential solutions early |
| 4 | Subsurface conditions may include rock and/or ledge | 4 | 2 | 2 | 8 | 8 | Accept | Conduct geotechnical studies | N/A | Final engineering design to address and mitigate risk |
| 5 | Critical material delivery delays | 2 | 2 | 2 | | | Mitigate | Start bid process early, obtain multiple bids | N/A | Work with vendor to avoid schedule impacts and/or revise construction activities sequence |
| 6 | Civil work for construction of substation entrance in close proximity of 345kV circuit, crews could inadvertently make contact with conductor causing circuit outage or property damage | 3 | 2 | 2 | 6 | 6 | Mitigate | Develop PHA | N/A | Revise PHA |



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3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|------------------------------------|--|----------------------------|--|---------------------------|
| Warwick, RI, Special Use Permit | Certain | 4 Months | Not Applied For | January 2015 |
| Warwick, RI, Curb Cut Permit | Certain | 3 Months | Not Applied For | February 2015 |
| Warwick, RI, Street Opening Permit | Certain | 3 Months | Not Applied For | February 2015 |
| Building Permit | Certain | 3 Months | Not Applied For | January 2015 |
| RIDEM Wetlands Permitting | Likely | 9 Months | Not Applied For | February 2015 |
| EFSB Notice of Intent | Certain | 4 Months | Not Applied For | May 2015 |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedule the substation will enter service in FY17 and the distribution projects will be included in each fiscal year's Annual ISR Filing until that time.

The circuit switcher and wave trap at New London Ave (C045313) is 100% PTF.

Wave traps at Johnston (C054436) and W Cranston substations are 100% PTF.

The transmission line tap (C031696) is non-PTF, however assets that are part of the mainline are PTF. PTF work on the T172S consists of removing existing structure #225 and its foundation, and installing new structure 225-1 approximately 65 feet back from the existing structure. Structure #225 is a davit arm suspension; Structure #225-1 will be a single pole deadend tap structure on concrete foundation, supporting two motor operated vertical break switches. Non-PTF work on the T172S consists of installing a new 3-pole deadend structure on concrete foundations, and two spans of 477 kcmil ACSR conductor. The tap line will have no Shieldwire.

Work on S171S (C031696) consists of replacing structure #241 with a 20-foot taller structure to provide clearance below for the tap line. The capacity of structure #241's existing foundation is insufficient for the loads applied by the taller pole, and therefore will also need to be replaced. All work on S171S will be PTF.

Work on 359 consists of replacing structure #201 with a 15-foot taller structure to provide clearance below for the tap line. The capacity of structure #201's foundation appears to be sufficient for the loads applied by the taller pole, however, work with the steel pole supplier may



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require retrofitting the foundation with additional anchor bolts. This need will be determined during step 2B in coordination with the steel pole supplier. All work on 359 will be PTF.

Work on 332 consists of installing phaseraisers at structures #198 and #199 to provide clearance below for the tap line. Structure #198 will be raised five feet, and structure #199 will be raised 15 feet. All work on 332 will be PTF.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$3.285M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

N/A



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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total |
|------------------------|---|----------------------------|-------------|-----------|--------------------------|------------------|------------------|------------------|------------------|-------------------|--------|
| | | | | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6+ 2019/20 | |
| C028920 | New London Ave Substation | +/- 25% | CapEx | 0.399 | 1.050 | 2.532 | 2.750 | 0.000 | 0.000 | 0.000 | 6.731 |
| | | | OpEx | 0.018 | 0.009 | 0.010 | 0.010 | 0.000 | 0.000 | 0.000 | 0.047 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.417 | 1.059 | 2.542 | 2.760 | 0.000 | 0.000 | 0.000 | 6.778 |
| C031696 | T172S Line Tap | +/- 25% | CapEx | 0.148 | 0.070 | 0.350 | 1.404 | 0.000 | 0.000 | 0.000 | 1.972 |
| | | | OpEx | 0.001 | 0.000 | 0.000 | 0.010 | 0.000 | 0.000 | 0.000 | 0.011 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.043 | 0.000 | 0.000 | 0.000 | 0.043 |
| | | | Total | 0.149 | 0.070 | 0.350 | 1.457 | 0.000 | 0.000 | 0.000 | 2.026 |
| C028921 | Distribution Getaways and 4kV Conversions | +/- 25% | CapEx | 0.010 | 0.800 | 3.300 | 2.500 | 0.000 | 0.000 | 0.000 | 6.610 |
| | | | OpEx | 0.000 | 0.050 | 0.234 | 0.065 | 0.000 | 0.000 | 0.000 | 0.349 |
| | | | Removal | 0.000 | 0.200 | 1.100 | 0.354 | 0.000 | 0.000 | 0.000 | 1.654 |
| | | | Total | 0.010 | 1.050 | 4.634 | 2.919 | 0.000 | 0.000 | 0.000 | 8.613 |
| C030161 | 3310 Reconductoring | +/- 25% | CapEx | 0.122 | 0.456 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.578 |
| | | | OpEx | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| | | | Removal | 0.002 | 0.068 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 |
| | | | Total | 0.124 | 0.526 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.650 |
| C054764 | 3311 Upgrades | +/- 25% | CapEx | 0.000 | 0.052 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.052 |
| | | | OpEx | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| | | | Removal | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.059 |
| C045313 | New London Ave Circuit Switcher and Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.089 | 0.088 | 0.000 | 0.000 | 0.000 | 0.182 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.089 | 0.088 | 0.000 | 0.000 | 0.000 | 0.182 |
| C054434 | W Cranston Substation - Install Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.150 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.150 |
| C054436 | Johnston Substation - Install Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.150 | 0.300 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.150 | 0.300 |
| Total Project Sanction | | | CapEx | 0.679 | 2.443 | 6.301 | 7.002 | 0.000 | 0.000 | 0.000 | 16.425 |
| | | | OpEx | 0.019 | 0.063 | 0.244 | 0.085 | 0.000 | 0.000 | 0.000 | 0.411 |
| | | | Removal | 0.002 | 0.273 | 1.100 | 0.397 | 0.000 | 0.000 | 0.000 | 1.772 |
| | | | Total | 0.700 | 2.779 | 7.645 | 7.484 | 0.000 | 0.000 | 0.000 | 18.608 |

It is expected that the plant will be capitalized at the ready for load date, unless otherwise specified.



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3.11.2 Project Budget Summary Table

Project Costs Per Business Plan (Transmission)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.270 | 0.560 | 0.450 | 0.000 | | | | 1.280 |
| OpEx | 0.001 | 0.020 | 0.000 | 0.000 | | | | 0.021 |
| Removal | 0.002 | 0.020 | 0.000 | 0.000 | | | | 0.022 |
| Total Cost in Bus. Plan | 0.273 | 0.600 | 0.450 | 0.000 | | | | 1.323 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.029 | (0.149) | (0.788) | | | | (0.908) |
| OpEx | 0.000 | 0.018 | (0.010) | (0.010) | | | | (0.002) |
| Removal | 0.000 | (0.048) | (0.070) | (0.030) | | | | (0.148) |
| Total Cost in Bus. Plan | 0.000 | (0.001) | (0.229) | (0.828) | | | | (1.058) |

Project Costs Per Business Plan (Distribution)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.409 | 2.300 | 2.600 | 0.200 | 0.000 | 0.000 | 0.000 | 5.509 |
| OpEx | 0.018 | 0.101 | 0.134 | 0.014 | 0.000 | 0.000 | 0.000 | 0.267 |
| Removal | 0.000 | 0.102 | 0.188 | 0.028 | 0.000 | 0.000 | 0.000 | 0.318 |
| Total Cost in Bus. Plan | 0.427 | 2.503 | 2.922 | 0.242 | 0.000 | 0.000 | 0.000 | 6.094 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.450 | (3.232) | (5.050) | 0.000 | 0.000 | 0.000 | (7.832) |
| OpEx | 0.000 | 0.042 | (0.110) | (0.061) | 0.000 | 0.000 | 0.000 | (0.129) |
| Removal | 0.000 | (0.098) | (0.912) | (0.326) | 0.000 | 0.000 | 0.000 | (1.336) |
| Total Cost in Bus. Plan | 0.000 | 0.394 | (4.254) | (5.437) | 0.000 | 0.000 | 0.000 | (9.297) |

3.11.3 Cost Assumptions

These cost estimates are based on planning grade (+/- 25%). Project sanction cost estimates will be developed after final design is completed.



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3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

This is not an NPV project.

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Department | Individual | Responsibilities |
|----------------------|---------------|--|
| Investment Planning | Glen DiConza | Endorses relative to distribution 5-year business plan or emergent work |
| Investment Planning | Michelle Park | Endorses relative to transmission 5-year business plan or emergent work |
| Resource Planning | Jim Patterson | Endorses D-Line resources, cost, estimate, schedule and Portfolio alignment |
| Resource Planning | Mark Phillips | Endorses D-Sub and T-Sub resources, cost, estimate, schedule and Portfolio alignment |
| Engineering / Design | John Gavin | Endorses substation scope, design, conformance with design standards |
| Engineering / Design | Mark Browne | Endorses transmission line scope, design, conformance with design standards |
| Engineering / Design | Len Swanson | Endorses substation scope, design, conformance with design standards |



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| | | |
|----------------------|----------------|---|
| Engineering / Design | Alan Labarre | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Engineering / Design | Carol Sedewitz | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Project Management | Tim Moore | Endorses Resources, cost estimate, schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|--------------------------|---------------------------------|
| Finance | Keith Fowler |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegates | Jennifer Grimsley / Nabil Hitti |
| Procurement | Art Curran |
| Control Center | Michael Gallagher |
| Control Center | Will Houston |

4 Appendices

4.1 Sanction Request Breakdown by Project

| \$M | C028920 | C031696 | C028921 | C030161 | C054764 | C045313 | C054434 | C054436 | Total |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| CapEx | 2.525 | 0.425 | 6.610 | 0.578 | 0.052 | 0.100 | 0.100 | 0.100 | 10.490 |
| OpEx | 0.018 | 0.001 | 0.349 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 0.372 |
| Removal | 0.000 | 0.000 | 1.654 | 0.070 | 0.005 | 0.000 | 0.000 | 0.000 | 1.729 |
| Total | 2.543 | 0.426 | 8.613 | 0.650 | 0.059 | 0.100 | 0.100 | 0.100 | 12.591 |



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4.2 Other Appendices

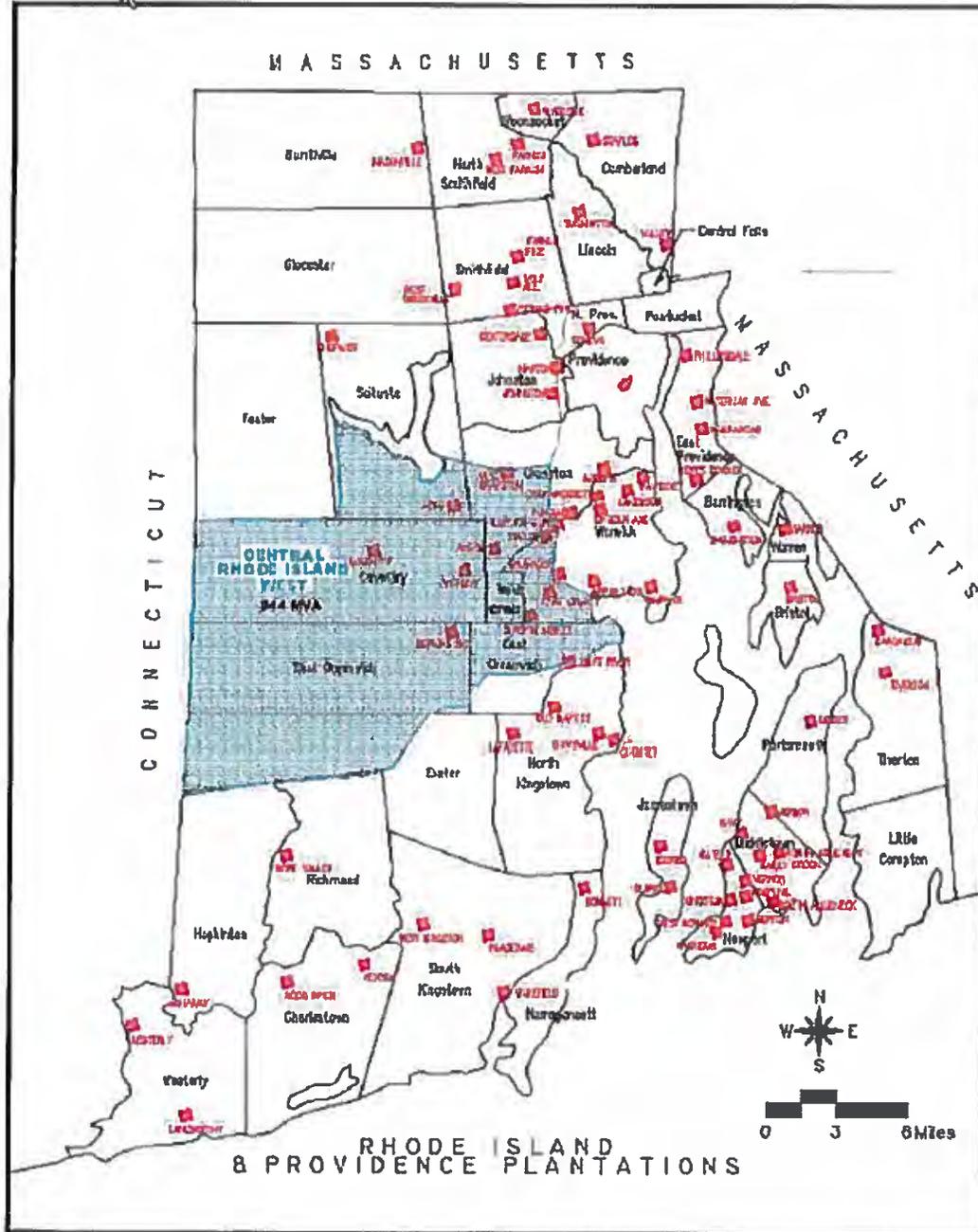


Figure 1 - Central Rhode Island West Study Area

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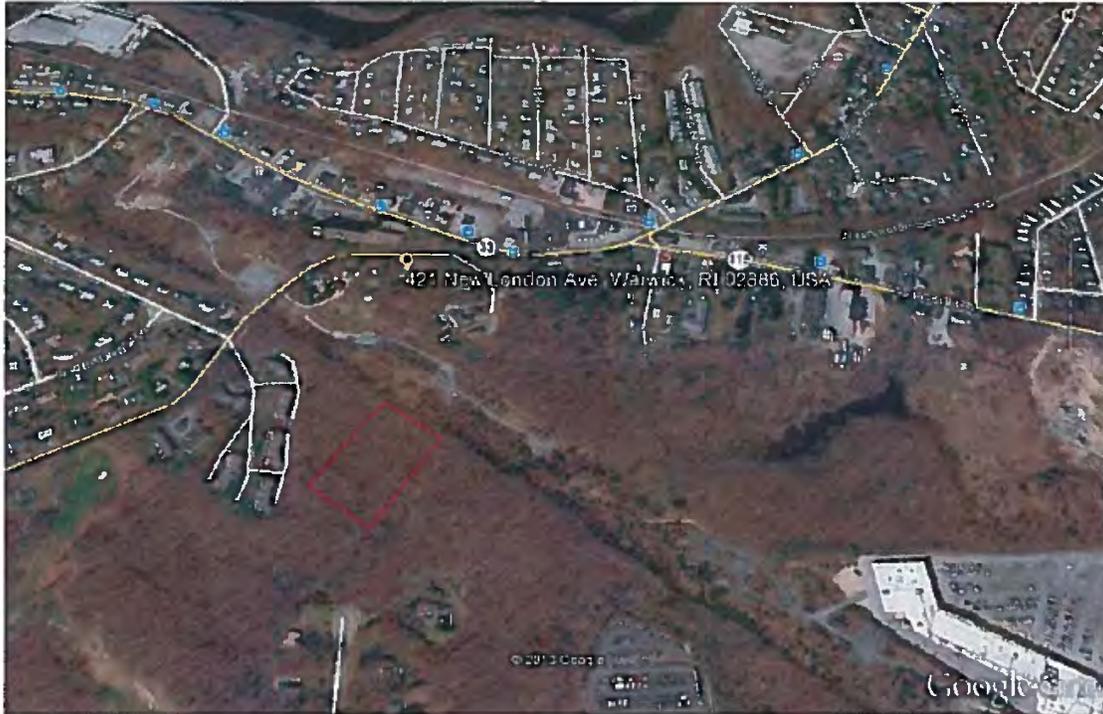
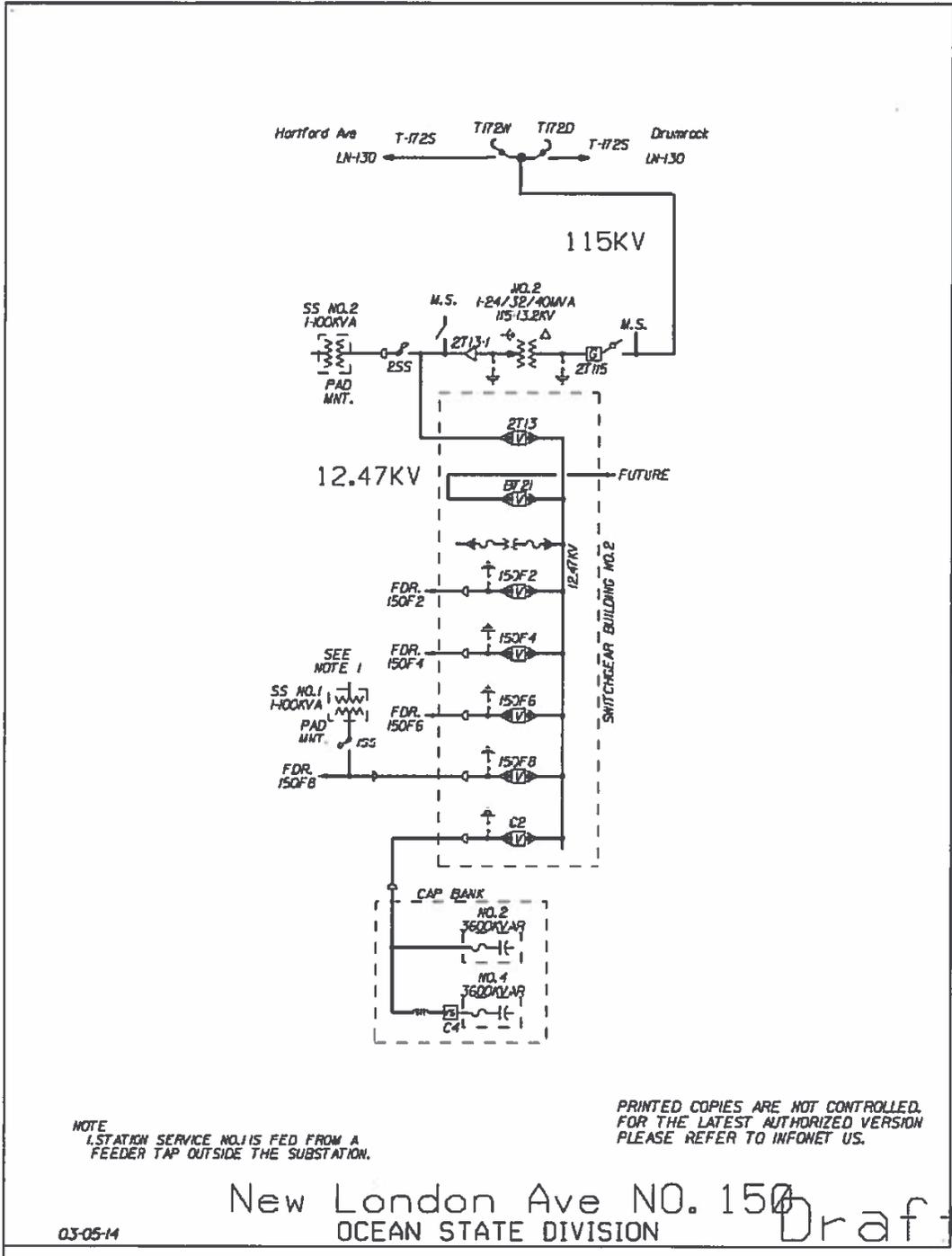


Figure 2 - Geographic Location of New London Ave Substation

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New London Ave.dwg 03/05/2014 9:46:27 AM

Figure 3 - New London Ave Proposed One Line

US Sanction Paper

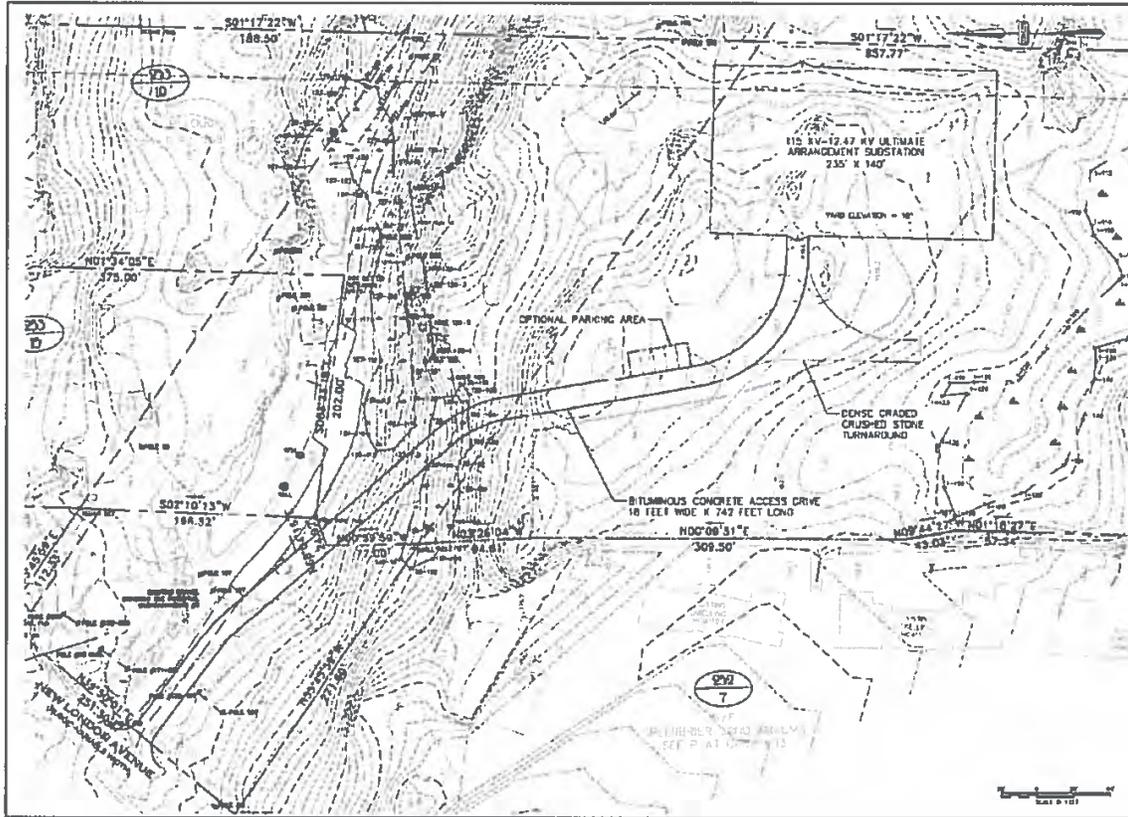


Figure 4 - New London Ave Substation Site Layout



US Sanction Paper

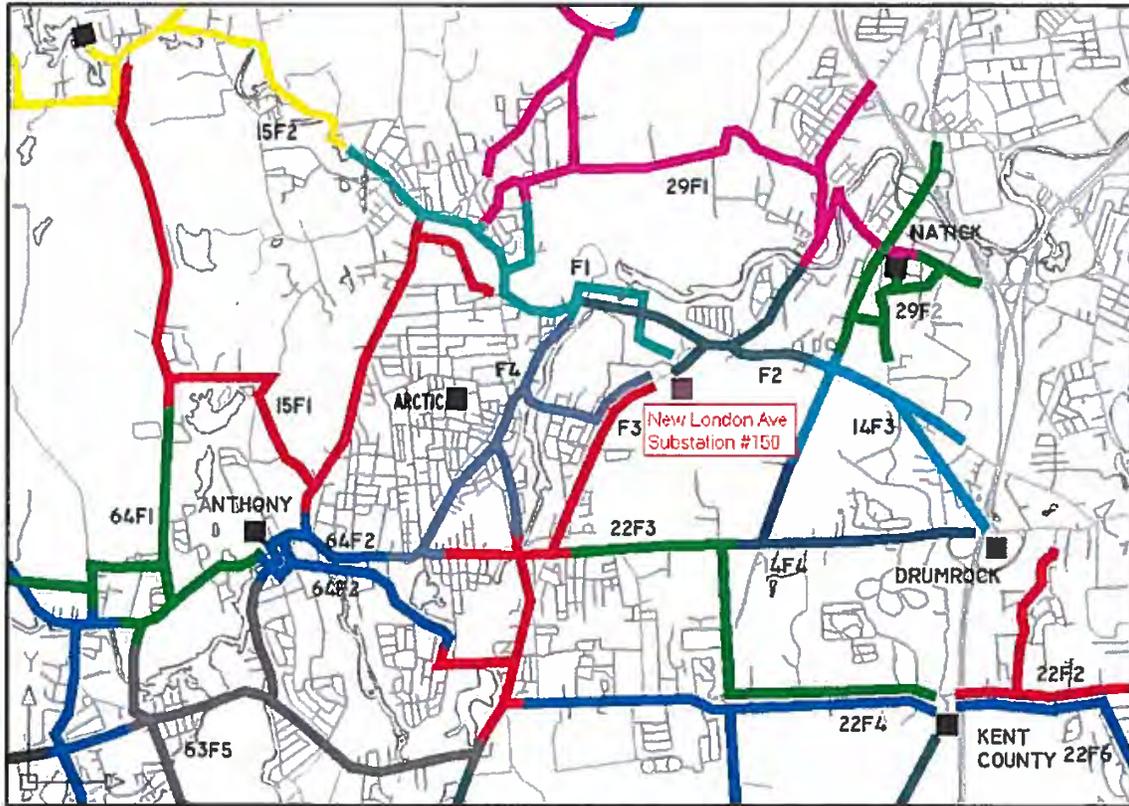


Figure 5 – Proposed 12.47kV Distribution Mainline Feeders

C028921

New London Ave (D-Line)

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|---|---|
| Fund Project Number: <u>C028921</u> | USSC #: <u>USSC-12-472v2 (DCIG100)</u> |
| Revision: <u>7</u> | Budget Version: <u>Default</u> |
| Project Title: <u>New London Ave (D-Line)</u> | |
| Project Description: This project recommends the installation of getaways for four distribution feeders and to reconductor existing distribution circuits on New London Ave. | |

| | |
|---|---|
| Project Status: <u>open</u> | |
| Responsible Person: <u>HURLEY, KATHLEEN</u> | Initiator: <u>Worme, Chris</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>39</u> | Project Complexity Score: <u>29</u> |

Project Schedule / Expenditures

| | | | | | |
|---|-----------------------|--|-----------------------|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>5/21/2008</u> | | Est Complete Date: <u>2/28/2017</u> | | | |
| Est In-Service Date: <u>12/31/2016</u> | | | | | |
| TTD Actuals: <u>\$1,310,887</u> | | As Of: <u>10/2/2017</u> | | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$6,610,000</u> | <u>\$349,000</u> | <u>\$1,654,000</u> | <u>\$8,613,000</u> | <u>\$0</u> |

Justification / Risk Identification:
 This project recommends the installation of getaways for four distribution feeders and to reconductor existing distribution circuits on New London Ave.

Project Scope:
 A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings

Project Alternatives Considered:

<Enter data here>

Additional Notes:

USSC-12-472 Partial Sanction total DoA \$770K. C031696 \$100K; C028920 \$250K; C028921 \$250K; C045313 \$75K; C030161 \$70K; C030161 \$25K

Related Projects:

Project Number:

Project Name:

Approvals

| | | | | | |
|---------|------|--------------------------|----------|---------------|----------------------|
| Line 1: | Date | <u>6/9/2014 14:41:15</u> | Approver | <u>carlim</u> | <u>USSC Approver</u> |
| Line 2: | Date | | Approver | | |
| Line 3: | Date | | Approver | | |
| Line 4: | Date | | Approver | | |
| Line 5: | Date | | Approver | | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028921 Current Total Authorized Amount: \$8,611... _ □ X

Title

Project Number

| | |
|---------------------------|--------------------------------|
| Budget Version | Default (active) |
| Revision | 12-472 v2 |
| Revision Status | Approved |
| Revision No. | <input type="text" value="7"/> |
| Est Start Date | 05/21/2008 |
| Est Complete Date | 02/28/2017 |
| Est In Srvc Date | 12/31/2016 |
| Capital | \$6,610,000.00 |
| Expense | \$349,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$1,654,000.00 |
| Total (excl. Ret.) | \$8,613,000.00 |
| Credits | \$0.00 |
| Net | \$8,613,000.00 |

Revision Info

Revision of 7

[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 1

This document has been reviewed for Critical Energy Infrastructure Information (CEII)

D+T



US Sanction Paper

| | | | |
|---------------------------|--|--------------------------|---|
| Title: | New London Avenue Substation #150 | Sanction Paper #: | USSC-12-472 v2 |
| Project #: | C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 5/14/14 |
| Author: | Marc Bristol | Sponsor: | Cheryl A. Warren, Vice President Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Marc Bristol |

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of projects C028920, C031696, C028921, C030161, C054764, C045313, C054434, and C054436 in the amount \$12.600M with a tolerance of +/- 10% for the purposes of final engineering and design, procurement of long lead materials, and initial construction activities.

This sanction amount is \$12.600M broken down into:

- \$10.490 Capex
- \$0.372 Opex
- \$1.729 Removal

NOTE the potential investment of \$18.600M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

1.2 Project Summary

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings.

The station will be located between West Cranston #21 and Drumrock #14 substations and supplied by a 115kV tap from the existing T-172S transmission line.

The station will be located on a purchased parcel of land adjacent to another company-owned parcel on New London Avenue.



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1.3 Summary of Projects

| Project Number | Project Type (Elec only) | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------|---|-----------------------|
| C028920 | Distribution Substation | New London Ave Substation | 6.778 |
| C031696 | Transmission Line | T172S Line Tap | 2.026 |
| C028921 | Distribution Line | Distribution Getaways and 4kV Conversions | 8.613 |
| C030161 | Transmission (SubT-Line) | 3310 Reconductoring | 0.650 |
| C054764 | Transmission (SubT-Line) | 3311 Upgrades | 0.059 |
| C045313 | Transmission Substation | New London Ave Circuit Switcher and Wave Trap | 0.182 |
| C054434 | Transmission | W Cranston Substation- Install Wave Trap | 0.150 |
| C054436 | Transmission | Johnston Substation - Install Wave Trap | 0.150 |
| Total | | | 18.608 |

1.4 Associated Projects

| Project Number | Project Title | Estimate Amount (\$M) |
|----------------|--------------------------------------|-----------------------|
| C053723 | Arctic Substation Retirement (D-Sub) | 0.250 |
| Total | | 0.250 |

1.5 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Paper Title | Sanction Type |
|------------|---------------------|-------------------|---|---------------|
| 12/12/2012 | USSC USSC-12-472 | \$0.770M | New London Ave Substation #150 | Partial |
| 06/30/2009 | AMIC SG114 | \$0.00M | Strategy to Build a 115/12.5kV Substation in West Warwick, RI | Strategy |
| 06/18/2009 | AMIC PWS0922 | \$0.175M | A New 115/12.5kV Substation in West Warwick RI | Partial |
| 10/01/2008 | DCIG DCIG1008P92 | \$0.365M | West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines | Partial |

1.6 Next Planned Sanction Review

| Date (Month/Year) | Purpose of Sanction Review |
|-------------------|----------------------------|
| July 2015 | Full implementation |



US Sanction Paper

1.7 Category

| Category | Reference to Mandate, Policy, or NPV Assumptions |
|---|---|
| <input type="radio"/> Mandatory <input checked="" type="radio"/> Policy- Driven <input type="radio"/> Justified NPV | The investment has been classified as policy driven. Without this project the company will not be able to provide a reliable electric service to the customers in the study area. |

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 29

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No



US Sanction Paper

1.11 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|--|---|--|--|
| New England Distribution FY15-FY19 C028920, C028921, | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$9.300M |
| New England Transmission FY15-FY19 C031696, C045313, C054434, C054436, C030161, C054764 | <input checked="" type="radio"/> Yes <input type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA | \$1.830M |

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

| \$M | Prior Yrs | Current Planning Horizon | | | | | | Total |
|--------------------|--------------|--------------------------|------------------|------------------|------------------|------------------|-------------------|---------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6+ 2019/20 | |
| CapEx | 0.679 | 2.443 | 6.301 | 7.002 | 0.000 | 0.000 | 0.000 | 16.425 |
| OpEx | 0.019 | 0.063 | 0.244 | 0.085 | 0.000 | 0.000 | 0.000 | 0.411 |
| Removal | 0.002 | 0.273 | 1.100 | 0.397 | 0.000 | 0.000 | 0.000 | 1.772 |
| CIAC/Reimbursement | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | 0.700 | 2.779 | 7.645 | 7.484 | 0.000 | 0.000 | 0.000 | 18.608 |



US Sanction Paper

1.14 Key Milestones

| Milestone | Target Date: (Month/Year) |
|--|---------------------------|
| Start Preliminary Engineering (kick-off meeting) | May 2009 |
| Partial Sanction | May 2014 |
| Distribution Line Design Complete – EDC | July 2014 |
| Distribution Line Construction Start | December 2014 |
| Substation Engineering Design Complete – EDC | May 2015 |
| Project Sanction | August 2015 |
| Substation Construction Start | October 2015 |
| Submit Facility Ratings to ISO | July 2016 |
| Substation Construction Complete – CC | November 2016 |
| Ready for Load - RFL | November 2016 |
| Distribution Line Construction Complete – CC | December 2016 |
| Project Closure Report | February 2017 |

1.15 Resources, Operations and Procurement

| Resource Sourcing | | | |
|--|--|--|--|
| Engineering & Design Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Construction/Implementation Resources to be provided | <input checked="" type="checkbox"/> Internal | <input checked="" type="checkbox"/> Contractor | |
| Resource Delivery | | | |
| Availability of internal resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Availability of external resources to deliver project: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Operational Impact | | | |
| Outage impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |
| Procurement Impact | | | |
| Procurement impact on network system: | <input type="radio"/> Red | <input type="radio"/> Amber | <input checked="" type="radio"/> Green |

1.16 Key Issues (include mitigation of Red or Amber Resources)

| | |
|---|--|
| 1 | Special use permit from the City of Warwick required |
| 2 | Outage required on the T172S for new 115kV tap; summer outage should be avoided |
| 3 | Historical raw material found on site, additional site exploration required for characterization |



US Sanction Paper

1.17 Climate Change

| | | | |
|--|--|--------------------------------|--------------------------------|
| Contribution to National Grid's 2050 80% emissions reduction target: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |
| Impact on adaptability of network for future climate change: | <input checked="" type="radio"/> Neutral | <input type="radio"/> Positive | <input type="radio"/> Negative |

1.18 List References

| | |
|---|--|
| 1 | USSC-12-472 – New London Ave Substation #150 December 2012 |
| 2 | SG114 - Strategy to Build a 115/12.5kV Substation in West Warwick, RI June 2009 |
| 3 | PWS0922 - A New 115/12.5kV Substation in West Warwick RI June 2009 |
| 4 | DCIG1008P92 – West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines May 2009 |



US Sanction Paper

2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on May 14, 2014:

(a) APPROVED the investment of \$12.600M and a tolerance of +/- 10% for final engineering and design, procurement of long lead materials, and initial construction activities.

(b) NOTED the potential investment \$18.600M to and a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Marc Bristol has the approved financial delegation to undertake the activities stated in (a).

Signature  Date 

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

| | | | |
|---------------------------|--|--------------------------|------------------|
| Title: | New London Avenue Substation #150 | Sanction Paper #: | USSC-12-472 v2 |
| Project #: | C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436 | Sanction Type: | Partial Sanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 5/14/14 |
| Author: | Marc Bristol | Sponsor: | Cheryl A. Warren |
| Utility Service: | Electricity T&D | Project Manager: | Marc Bristol |

3.1 *Background*

The Central Rhode Island West study area encompasses the Towns of Coventry, West Greenwich, and West Warwick and sections of the Cities of Cranston and Warwick, and Towns of East Greenwich, Exeter, and Scituate. The area load peaked at approximately 169 MVA in 2012 with 47,000 customers served. The study area and existing area substations are shown in Figure 1 of the appendix.

In 2008 a comprehensive study was completed for this area. This study identified an immediate need for new distribution capacity in the area to resolve short-term loading concerns and a new substation in the Warwick/West Warwick area to resolve long-term loading concerns and significant exposure for various n-1 contingencies. The 2012 Annual Capacity Plan still supports the need for a new substation in this area.

The Central Rhode Island West study area is still supplied by a highly utilized supply and distribution system. It is becoming increasingly challenging to operate this system within normal loading limits and to supply load growth in this area. This strategy paper documents the long-term solution for the area.

3.2 *Drivers*

The primary driver is projected thermal overloads of transformers, distribution feeders and supply lines during period of system peak loading. There have been a number of large developments in the area such as The Centre of New England and the Royal Mills complex that continue to add load to an area with heavily loaded feeders and supply lines. A new modular feeder along with load transfers have been utilized to prevent thermal overloads as a result of the new load.

The tables below show the facilities in the study area that are projected to exceed 100% of their rating during either normal operation or contingencies. Table 1 below shows feeders in the area with loads projected to exceed 100% of their normal rating; Table 2 shows transformers with loads projected to exceed 100% of their normal rating; and Table 3 shows the supply lines that are overloaded during contingencies.



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| Substation | Feeder | SN Rating (Amps) | 2014 | | 2016 | | 2018 | | 2020 | |
|--------------|--------|------------------|------|------|------|------|------|------|------|------|
| | | | Amps | %SN | Amps | %SN | Amps | %SN | Amps | %SN |
| ANTHONY | 64F1 | 361 | 336 | 93% | 353 | 98% | 359 | 99% | 363 | 101% |
| ANTHONY | 64F2 | 361 | 344 | 95% | 361 | 100% | 367 | 102% | 372 | 103% |
| HOPE | 15F2 | 476 | 465 | 98% | 487 | 102% | 496 | 104% | 502 | 105% |
| HOPKINS HILL | 63F2 | 530 | 512 | 97% | 537 | 101% | 546 | 103% | 553 | 104% |
| KENT COUNTY | 22F3 | 530 | 487 | 92% | 511 | 96% | 520 | 98% | 527 | 99% |
| KENT COUNTY | 22F4 | 586 | 579 | 99% | 607 | 104% | 618 | 105% | 626 | 107% |
| ARCTIC | 49J4 | 295 | 294 | 100% | 308 | 104% | 313 | 106% | 317 | 108% |

Table 1 - Projected loads through 2020 for feeders and loads greater than 100%

| Substation | Transformer | 2014 | | 2016 | | 2018 | | 2020 | |
|------------|-------------|------|------|------|------|------|------|------|------|
| | | MVA | % SN |
| ANTHONY | 1 | 7.3 | 93% | 7.6 | 98% | 7.7 | 99% | 7.8 | 101% |
| ANTHONY | 2 | 7.4 | 95% | 7.8 | 100% | 7.9 | 102% | 8.0 | 103% |

Table 2 - Projected Loads through 2020 for Transformers with Loads Greater than 100%

| Circuit | Line Section | | 2014 | | 2016 | | 2018 | | 2020 | |
|---------|---------------------|--------------------|--------------|------|------|------|------|------|------|------|
| | From | To | MVA | % SE | MVA | % SE | MVA | % SE | MVA | % SE |
| | 2230 | Natick 29 Tap | Artic 49 Tap | 37.5 | 106% | 39.3 | 111% | 40.0 | 113% | 40.5 |
| 2230 | Warwick Mall 28 Tap | Natick 29 | 16.1 | 105% | 16.9 | 110% | 17.2 | 112% | 17.4 | 113% |
| 2232 | Anthony Tap | Coventry Tap | 16.0 | 104% | 16.8 | 110% | 17.1 | 112% | 17.3 | 113% |
| 3310 | Kent County 22 | Major Potter Rd | | | | | | | | |
| 3310 | Major Potter Rd | Hopkins Hill Riser | | | | | | | | |
| 3311 | Kent County 22 | Hopkins Hill Tap | | | | | | | | |
| 3311 | Hopkins Hill Tap | Hopkins Hill 63 | | | | | | | | |

Table 3 - Projected Contingency Loads through 2020 for Supply Line Segments with Loads Greater than 100%

The tables below show projected loading after the New London Ave substation is placed in service. Table 4 below shows projected feeder loading; Table 5 below shows projected transformer loading; and Table 6 below shows projected supply line loading post an n-1 contingency.



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| Substation | Feeder | SN Rating (Amps) | 2014 | | 2016 | | 2018 | | 2020 | |
|--------------|--------|------------------------|------|------|------|-----|------|------|------|------|
| | | | Amps | %SN | Amps | %SN | Amps | %SN | Amps | %SN |
| ANTHONY | 64F1 | 361 | 355 | 98% | 304 | 84% | 317 | 88% | 329 | 91% |
| ANTHONY | 64F2 | 361 | 363 | 101% | 313 | 87% | 327 | 91% | 339 | 94% |
| HOPE | 15F2 | 476 | 529 | 111% | 402 | 84% | 419 | 88% | 435 | 91% |
| HOPKINS HILL | 63F2 | 530 | 536 | 101% | 515 | 97% | 537 | 101% | 558 | 105% |
| KENT COUNTY | 22F3 | 530 | 547 | 103% | 289 | 54% | 301 | 57% | 313 | 59% |
| KENT COUNTY | 22F4 | 586 | 580 | 99% | 555 | 95% | 579 | 99% | 601 | 103% |
| ARCTIC | 49J4 | 452 | 317 | 70% | 274 | 61% | 285 | 63% | 296 | 66% |
| WEST WARWICK | F1 | | | | 455 | 71% | 474 | 74% | 493 | 76% |
| WEST WARWICK | F2 | | | | 347 | 66% | 362 | 68% | 376 | 71% |
| WEST WARWICK | F3 | | | | 309 | 58% | 322 | 61% | 334 | 63% |
| WEST WARWICK | F4 | | | | 327 | 51% | 341 | 53% | 354 | 55% |

Table 4 - Project Loads through 2020 for Feeders Post New London Ave Substation

| Substation | Tranf. ID. | 2016 | | 2018 | | 2020 | |
|------------|------------|------|------|------|------|------|------|
| | | MVA | % SN | MVA | % SN | MVA | % SN |
| ANTHONY | 1 | 6.6 | 84% | 6.8 | 88% | 7.1 | 91% |
| ANTHONY | 2 | 6.8 | 87% | 7.1 | 90% | 7.3 | 94% |

Table 5 - Project Loads through 2020 for Transformers Post New London Ave Substation

| Circuit | Line Section | | 2016 | | 2018 | | 2020 | |
|---------|---------------------|--------------------|------|---------------|--------------|------|------|------|
| | From | To | MVA | % SE | MVA | % SE | MVA | % SE |
| | | | 2230 | Natick 29 Tap | Artic 49 Tap | 33.6 | 95% | 34.2 |
| 2230 | Warwick Mall 28 Tap | Natick 29 | 15.3 | 100% | 15.6 | 102% | 15.8 | 103% |
| 2232 | Anthony Tap | Coventry Tap | 14.8 | 96% | 15.0 | 98% | 15.2 | 99% |
| 3310 | Kent County 22 | Major Potter Rd | | | | | | |
| 3310 | Major Potter Rd | Hopkins Hill Riser | | | | | | |
| 3311 | Kent County 22 | Hopkins Hill Tap | | | | | | |
| 3311 | Hopkins Hill Tap | Hopkins Hill 63 | | | | | | |

Table 6 - Projected Contingency Loads through 2020 for Supply Line Segments Post New London Ave Substation



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3.3 Project Description

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. The station will be located adjacent to the transmission corridor between West Cranston and Drumrock substations and supplied by a 115 kV tap from an existing transmission line. The proposed geographical location of the proposed new substation is shown in Figure 2, and proposed one line shown in Figure 3 of the appendix.

Initially, four 12.47 kV feeders will be installed through approximately 2500 ft manhole and duct system, and the existing distribution system will be rearranged to offload existing transformers, supply lines and distribution feeders. The new feeders will supply load currently fed from the four 4kV Arctic substation feeders, these circuits will be converted to 12.47 kV and the substation retired under associated project funding number C053723.

The layout of the 12.47 kV distribution feeders, after installation of the substation is shown in Figure 5 of the appendix.

There are two sections of the 3310 and 3311 supply lines that are projected to be overloaded on contingency after the new station is in service. These lines are classified as transmission assets. The estimated cost of reconductoring approximately 5,000 ft of the 3310 line to eliminate the overloads is estimated at \$650,000 and the cost of upgrading the 3311 for 120°C operation is \$20,000. The alternative to the reconductoring and upgrading these lines is to remotely drop a feeder at Hopkins Hill substation on supply line contingency. It is recommended that these two circuits be upgraded.

Simulation results indicate that the addition of the New London Ave substation and 0.04 mile transmission tap would result in unacceptable attenuation of the 240 kHz power line carrier (PLC) signal. Acceptable channel performance will be achieved by installing wave traps at New London Ave, Johnston, and West Cranston substations.

3.4 Benefits Summary

Relief of the customer's (Narragansett Electric Company) potential distribution loading issues and improving the reliability of the distribution supply system in the Central Rhode Island West area are the primary benefits of this project.

3.5 Business and Customer Issues

The land purchase was completed as of August 28, 2013.

3.6 Alternatives

Alternative 1: Expansion of West Cranston and Kent County substations

One alternative involved the expansion of existing 115/12.47kV substations at West Cranston and Kent and Kent County substations. The supply lines would have to be rebuilt for a larger capacity to accommodate two new modular stations in West Warwick and Coventry. It will be necessary to procure sites with the appropriate zoning for each station. The distribution system



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will be modified to accommodate the new stations. The estimated distribution cost of this option is \$11,300,000. There will be an additional \$3,800,000 in associated transmission costs. This option exceeded the cost of the preferred option; there are no additional benefits; and the uncertainty of finding appropriate lots make this option unattractive at this time.

Alternative 2: New 115/12.47kV substation in Cranston

A second alternative considered was the development of a new 115/12.47kV metal clad station on a site in Cranston near Phenix Avenue. The transmission costs are similar to the preferred plan, however, the distribution costs to extend feeders from this site to relieve the overloaded feeders and supply lines would be significantly more due to the limited routes available and the distance from the overloaded facilities. The detail of this option were not fully developed as the estimated distribution costs far exceeded those of the preferred alternative which was near the stations with loading issues. This option is also not recommended at this time.

3.7 Safety, Environmental and Project Planning Issues

Safety

All National Grid safety procedures will be followed at the site. This is a green field site and the majority of the work can be done before the station is energized. Clearances to live equipment must be maintained.

The equipment and fencing yard will be dimensioned to allow safe access around the yard for O&M equipment.

A secondary gate, remote from the primary yard entrance, will be provided for emergency egress from the yard.

The new Metal-Clad Switchgear Power Center (MCSPC) is designed with the switchgear in one room and the control switchboards in another to minimize personnel exposure to unsafe conditions. A door is provided between the two rooms as added protection from a fault in the switchgear area entering unimpeded into the control area.

Protective relays and controls will not be installed on the doors of the switchgear to eliminate potential personnel exposure to an arc fault condition while performing control or maintenance activities.

Environmental

As part of the due diligence process, a Phase 1 Environmental Site Assessment (ESA) was conducted with no Recognizable Environmental Conditions (RECs) found.

An Archaeological site review identified historical raw materials within the bounds of the proposed substation. A Phase 2 Archaeological site evaluation will be performed for characterization.

A Storm Water Pollution Prevention Plan (SWPPP) will be required.



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The land parcel has several wetlands. It is likely that the Rhode Island Department of Environmental Management (RIDEM) freshwater wetlands permitting will be required.

A Soil Erosion and Sediment Control Plan may be required by the City of Warwick.

Planning

A special use permit will be required to use the property for a substation. As part of that permit, requirements for fencing, driveways, landscape and screening, and setbacks must be met, or variances applied for and obtained.

The level of Stakeholder Management involvement is high as a result of proximity to abutters. The team will meet with the City of Warwick and abutters after site plans are finalized. The site design shall attempt to maintain natural screening to the residential abutters and landscaping will be provided to enhance the natural screening.

A noise study is being performed using the assumptions of 67 dBA NEMA low noise or 65 dBA very low noise to limit noise increases at nearby residences to 5 dBA or less.

3.8 Execution Risk Appraisal

| Number | Detailed Description of Risk / Opportunity | Probability | Impact | | Score | | Strategy | Pre-Trigger Mitigation Plan | Residual Risk | Post Trigger Mitigation Plan |
|--------|---|-------------|--------|----------|-------|----------|----------|---|---------------|---|
| | | | Cost | Schedule | Cost | Schedule | | | | |
| 1 | Wetlands mitigation required by agencies may be greater than anticipated | 3 | 2 | 4 | 6 | 12 | Accept | Begin permitting process as early as possible to quantify risk and develop mitigation plans and designs | N/A | Address with offsets |
| 2 | Data recovery may be required for historical raw material found on site | 4 | 2 | 3 | 8 | 12 | Accept | Perform Phase 2 Archaeological site evaluation for characterization | N/A | Perform Data Recovery of material |
| 3 | Abutters views of substation, T-line construction could cause delays | 3 | 2 | 1 | 6 | | Accept | Initiate outreach plan early | N/A | Address identified abutter issues with potential solutions early |
| 4 | Subsurface conditions may include rock and/or ledge | 4 | 2 | 2 | 8 | 8 | Accept | Conduct geotechnical studies | N/A | Final engineering design to address and mitigate risk |
| 5 | Critical material delivery delays | 2 | 2 | 2 | | | Mitigate | Start bid process early, obtain multiple bids | N/A | Work with vendor to avoid schedule impacts and/or revise construction activities sequence |
| 6 | Civil work for construction of substation entrance in close proximity of 345kV circuit, crews could inadvertently make contact with conductor causing circuit outage or property damage | 3 | 2 | 2 | 6 | 6 | Mitigate | Develop PHA | N/A | Revise PHA |



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3.9 Permitting

| Permit Name | Probability Required (Certain/ Likely/ Unlikely) | Duration To Acquire Permit | Status (Complete/ In Progress Not Applied For) | Estimated Completion Date |
|------------------------------------|--|----------------------------|--|---------------------------|
| Warwick, RI, Special Use Permit | Certain | 4 Months | Not Applied For | January 2015 |
| Warwick, RI, Curb Cut Permit | Certain | 3 Months | Not Applied For | February 2015 |
| Warwick, RI, Street Opening Permit | Certain | 3 Months | Not Applied For | February 2015 |
| Building Permit | Certain | 3 Months | Not Applied For | January 2015 |
| RIDEM Wetlands Permitting | Likely | 9 Months | Not Applied For | February 2015 |
| EFSB Notice of Intent | Certain | 4 Months | Not Applied For | May 2015 |

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedule the substation will enter service in FY17 and the distribution projects will be included in each fiscal year's Annual ISR Filing until that time.

The circuit switcher and wave trap at New London Ave (C045313) is 100% PTF.

Wave traps at Johnston (C054436) and W Cranston substations are 100% PTF.

The transmission line tap (C031696) is non-PTF, however assets that are part of the mainline are PTF. PTF work on the T172S consists of removing existing structure #225 and its foundation, and installing new structure 225-1 approximately 65 feet back from the existing structure. Structure #225 is a davit arm suspension; Structure #225-1 will be a single pole deadend tap structure on concrete foundation, supporting two motor operated vertical break switches. Non-PTF work on the T172S consists of installing a new 3-pole deadend structure on concrete foundations, and two spans of 477 kcmil ACSR conductor. The tap line will have no Shieldwire.

Work on S171S (C031696) consists of replacing structure #241 with a 20-foot taller structure to provide clearance below for the tap line. The capacity of structure #241's existing foundation is insufficient for the loads applied by the taller pole, and therefore will also need to be replaced. All work on S171S will be PTF.

Work on 359 consists of replacing structure #201 with a 15-foot taller structure to provide clearance below for the tap line. The capacity of structure #201's foundation appears to be sufficient for the loads applied by the taller pole, however, work with the steel pole supplier may



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require retrofitting the foundation with additional anchor bolts. This need will be determined during step 2B in coordination with the steel pole supplier. All work on 359 will be PTF.

Work on 332 consists of installing phaseraisers at structures #198 and #199 to provide clearance below for the tap line. Structure #198 will be raised five feet, and structure #199 will be raised 15 feet. All work on 332 will be PTF.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$3.285M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

N/A



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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total | |
|------------------------|---|----------------------------|-------------|-----------|--------------------------|---------|---------|---------|---------|---------|-------|--------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6+ | | |
| | | | | | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 | | |
| C028920 | New London Ave Substation | +/- 25% | CapEx | 0.399 | 1.050 | 2.532 | 2.750 | 0.000 | 0.000 | 0.000 | 0.000 | 6.731 |
| | | | OpEx | 0.018 | 0.009 | 0.010 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.047 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.417 | 1.059 | 2.542 | 2.760 | 0.000 | 0.000 | 0.000 | 0.000 | 6.778 |
| C031696 | T172S Line Tap | +/- 25% | CapEx | 0.148 | 0.070 | 0.350 | 1.404 | 0.000 | 0.000 | 0.000 | 0.000 | 1.972 |
| | | | OpEx | 0.001 | 0.000 | 0.000 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.043 | 0.000 | 0.000 | 0.000 | 0.000 | 0.043 |
| | | | Total | 0.149 | 0.070 | 0.350 | 1.457 | 0.000 | 0.000 | 0.000 | 0.000 | 2.026 |
| C028921 | Distribution Getaways and 4kV Conversions | +/- 25% | CapEx | 0.010 | 0.800 | 3.300 | 2.500 | 0.000 | 0.000 | 0.000 | 0.000 | 6.610 |
| | | | OpEx | 0.000 | 0.050 | 0.234 | 0.065 | 0.000 | 0.000 | 0.000 | 0.000 | 0.349 |
| | | | Removal | 0.000 | 0.200 | 1.100 | 0.354 | 0.000 | 0.000 | 0.000 | 0.000 | 1.654 |
| | | | Total | 0.010 | 1.050 | 4.634 | 2.919 | 0.000 | 0.000 | 0.000 | 0.000 | 8.613 |
| C030161 | 3310 Reconductoring | +/- 25% | CapEx | 0.122 | 0.456 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.578 |
| | | | OpEx | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| | | | Removal | 0.002 | 0.068 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.070 |
| | | | Total | 0.124 | 0.526 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.650 |
| C054764 | 3311 Upgrades | +/- 25% | CapEx | 0.000 | 0.052 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.052 |
| | | | OpEx | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| | | | Removal | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 |
| | | | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.059 |
| C045313 | New London Ave Circuit Switcher and Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.089 | 0.088 | 0.000 | 0.000 | 0.000 | 0.000 | 0.182 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.089 | 0.088 | 0.000 | 0.000 | 0.000 | 0.000 | 0.182 |
| C054434 | W Cranston Substation - Install Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.000 | 0.150 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.000 | 0.150 |
| C054436 | Johnston Substation - Install Wave Trap | +/- 25% | CapEx | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.150 | 0.300 |
| | | | OpEx | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Removal | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | Total | 0.000 | 0.005 | 0.015 | 0.130 | 0.000 | 0.000 | 0.000 | 0.150 | 0.300 |
| Total Project Sanction | | | CapEx | 0.679 | 2.443 | 6.301 | 7.002 | 0.000 | 0.000 | 0.000 | 0.000 | 16.425 |
| | | | OpEx | 0.019 | 0.063 | 0.244 | 0.085 | 0.000 | 0.000 | 0.000 | 0.000 | 0.411 |
| | | | Removal | 0.002 | 0.273 | 1.100 | 0.397 | 0.000 | 0.000 | 0.000 | 0.000 | 1.772 |
| | | | Total | 0.700 | 2.779 | 7.645 | 7.484 | 0.000 | 0.000 | 0.000 | 0.000 | 18.608 |

It is expected that the plant will be capitalized at the ready for load date, unless otherwise specified.



US Sanction Paper

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan (Transmission)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.270 | 0.560 | 0.450 | 0.000 | | | | 1.280 |
| OpEx | 0.001 | 0.020 | 0.000 | 0.000 | | | | 0.021 |
| Removal | 0.002 | 0.020 | 0.000 | 0.000 | | | | 0.022 |
| Total Cost in Bus. Plan | 0.273 | 0.600 | 0.450 | 0.000 | | | | 1.323 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.029 | (0.149) | (0.788) | | | | (0.908) |
| OpEx | 0.000 | 0.018 | (0.010) | (0.010) | | | | (0.002) |
| Removal | 0.000 | (0.048) | (0.070) | (0.030) | | | | (0.148) |
| Total Cost in Bus. Plan | 0.000 | (0.001) | (0.229) | (0.828) | | | | (1.058) |

Project Costs Per Business Plan (Distribution)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|--------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.409 | 2.300 | 2.600 | 0.200 | 0.000 | 0.000 | 0.000 | 5.509 |
| OpEx | 0.018 | 0.101 | 0.134 | 0.014 | 0.000 | 0.000 | 0.000 | 0.267 |
| Removal | 0.000 | 0.102 | 0.188 | 0.028 | 0.000 | 0.000 | 0.000 | 0.318 |
| Total Cost in Bus. Plan | 0.427 | 2.503 | 2.922 | 0.242 | 0.000 | 0.000 | 0.000 | 6.094 |

Variance (Business Plan-Project Estimate)

| | Prior Yrs (Actual) | Current Planning Horizon | | | | | | Total |
|--------------------------------|-----------------------|--------------------------|------------------|------------------|------------------|------------------|--------------------|----------------|
| | | Yr. 1 2014/15 | Yr. 2 2015/16 | Yr. 3 2016/17 | Yr. 4 2017/18 | Yr. 5 2018/19 | Yr. 6 + 2019/20 | |
| \$M | | | | | | | | |
| CapEx | 0.000 | 0.450 | (3.232) | (5.050) | 0.000 | 0.000 | 0.000 | (7.832) |
| OpEx | 0.000 | 0.042 | (0.110) | (0.061) | 0.000 | 0.000 | 0.000 | (0.129) |
| Removal | 0.000 | (0.098) | (0.912) | (0.326) | 0.000 | 0.000 | 0.000 | (1.336) |
| Total Cost in Bus. Plan | 0.000 | 0.394 | (4.254) | (5.437) | 0.000 | 0.000 | 0.000 | (9.297) |

3.11.3 Cost Assumptions

These cost estimates are based on planning grade (+/- 25%). Project sanction cost estimates will be developed after final design is completed.



US Sanction Paper

3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

This is not an NPV project.

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

| Department | Individual | Responsibilities |
|----------------------|---------------|--|
| Investment Planning | Glen DiConza | Endorses relative to distribution 5-year business plan or emergent work |
| Investment Planning | Michelle Park | Endorses relative to transmission 5-year business plan or emergent work |
| Resource Planning | Jim Patterson | Endorses D-Line resources, cost, estimate, schedule and Portfolio alignment |
| Resource Planning | Mark Phillips | Endorses D-Sub and T-Sub resources, cost, estimate, schedule and Portfolio alignment |
| Engineering / Design | John Gavin | Endorses substation scope, design, conformance with design standards |
| Engineering / Design | Mark Browne | Endorses transmission line scope, design, conformance with design standards |
| Engineering / Design | Len Swanson | Endorses substation scope, design, conformance with design standards |



US Sanction Paper

| | | |
|----------------------|----------------|---|
| Engineering / Design | Alan Labarre | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Engineering / Design | Carol Sedewitz | Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives |
| Project Management | Tim Moore | Endorses Resources, cost estimate, schedule |

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

| Function | Individual |
|--------------------------|---------------------------------|
| Finance | Keith Fowler |
| Regulatory | Peter Zschokke |
| Jurisdictional Delegates | Jennifer Grimsley / Nabil Hitti |
| Procurement | Art Curran |
| Control Center | Michael Gallagher |
| Control Center | Will Houston |

4 Appendices

4.1 Sanction Request Breakdown by Project

| \$M | C028920 | C031696 | C028921 | C030161 | C054764 | C045313 | C054434 | C054436 | Total |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| CapEx | 2.525 | 0.425 | 6.610 | 0.578 | 0.052 | 0.100 | 0.100 | 0.100 | 10.490 |
| OpEx | 0.018 | 0.001 | 0.349 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 0.372 |
| Removal | 0.000 | 0.000 | 1.654 | 0.070 | 0.005 | 0.000 | 0.000 | 0.000 | 1.729 |
| Total | 2.543 | 0.426 | 8.613 | 0.650 | 0.059 | 0.100 | 0.100 | 0.100 | 12.591 |



US Sanction Paper

4.2 Other Appendices

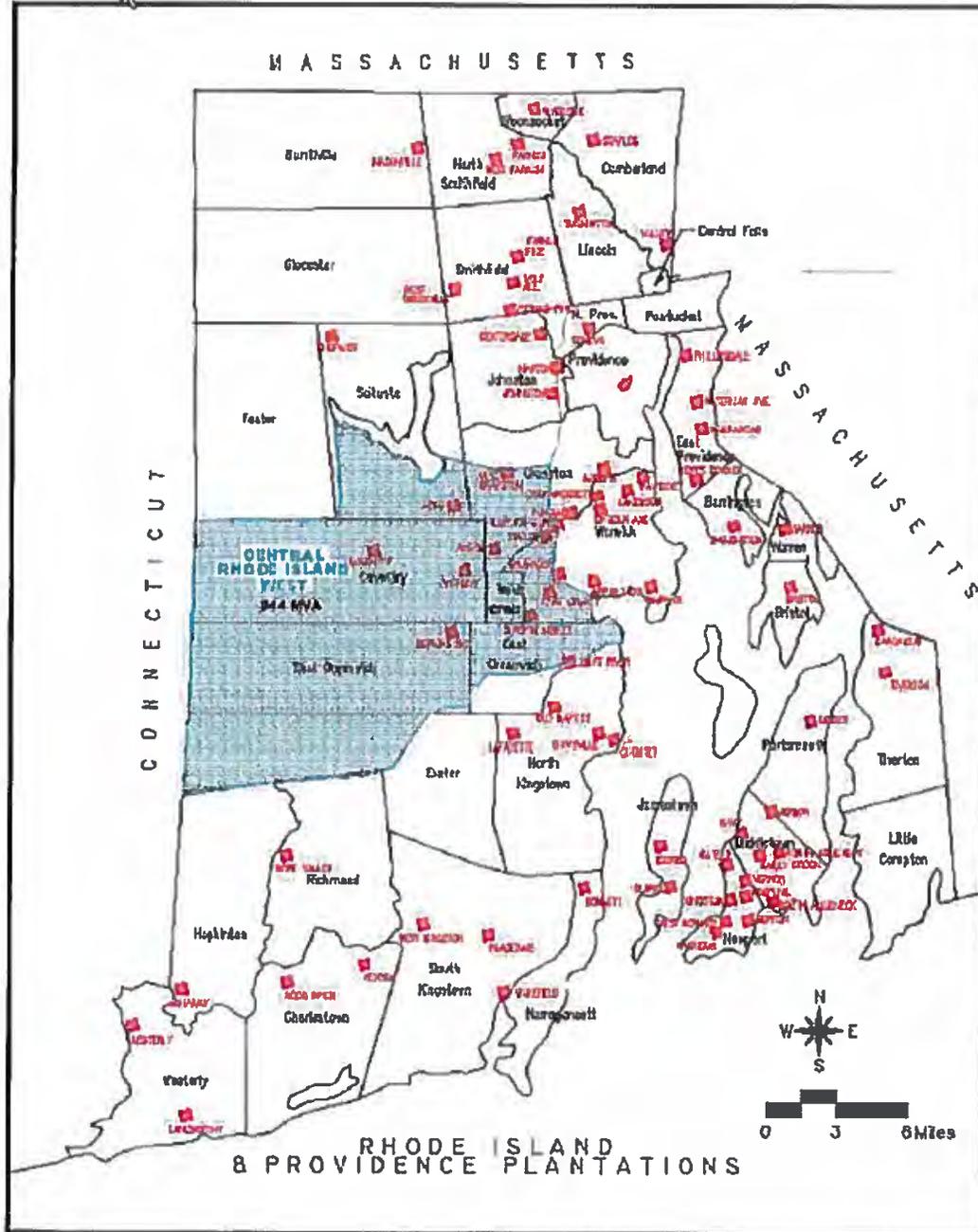


Figure 1 - Central Rhode Island West Study Area

US Sanction Paper

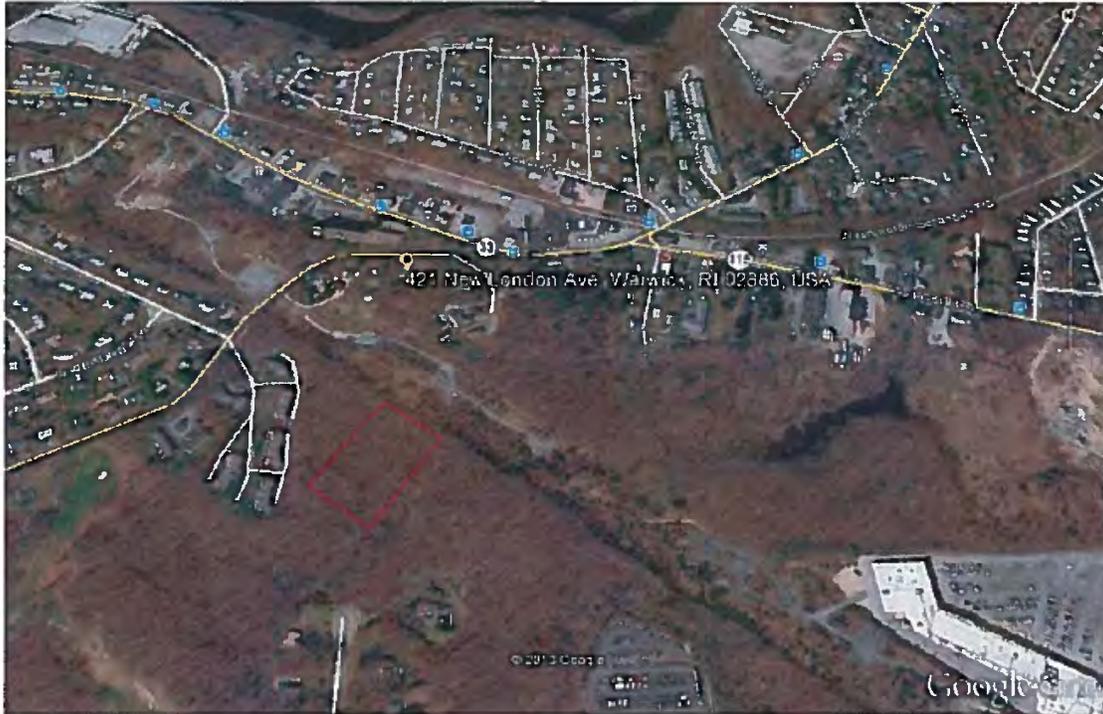
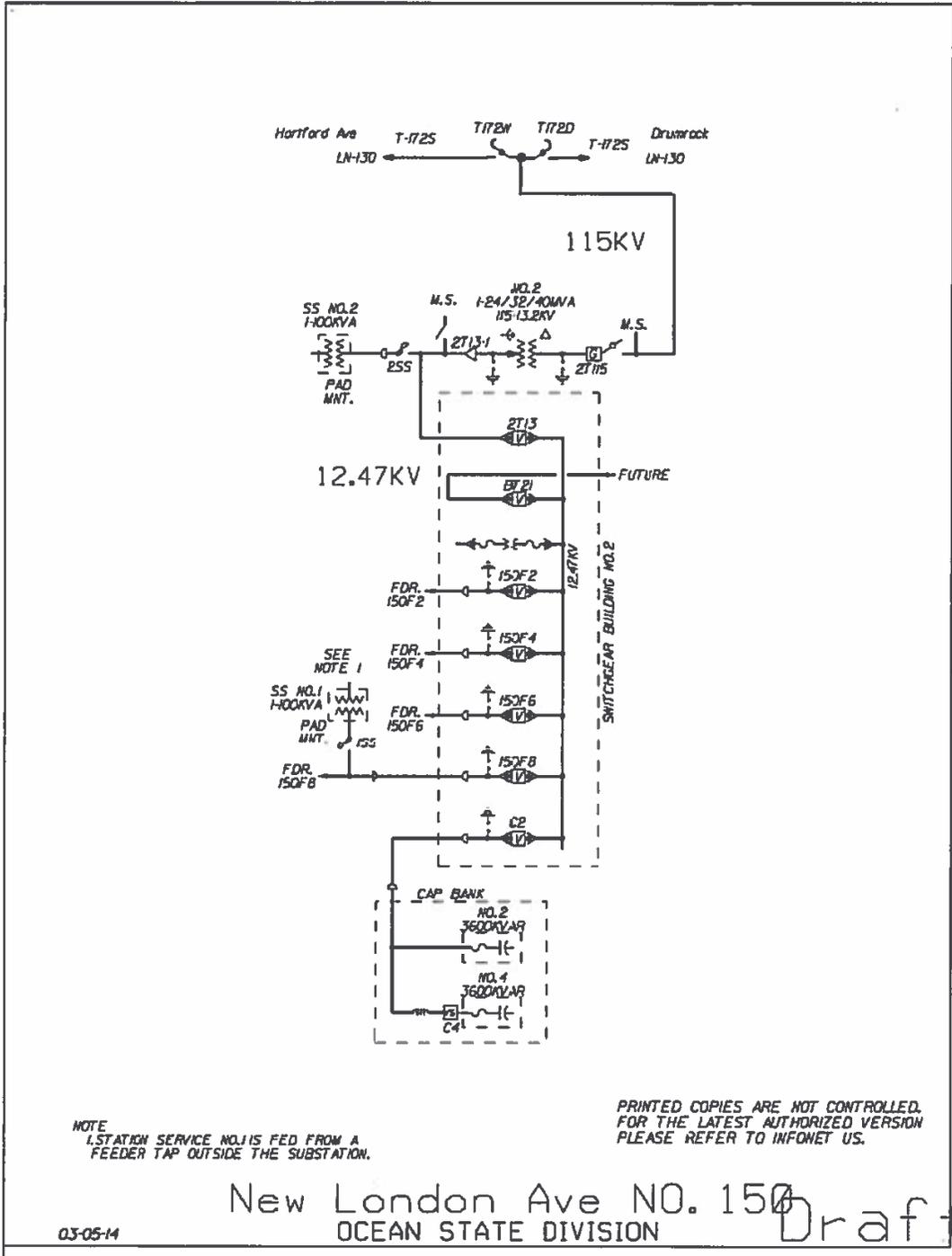


Figure 2 - Geographic Location of New London Ave Substation

US Sanction Paper

nationalgrid



New London Ave.dwg 03/05/2014 9:46:27 AM

Figure 3 - New London Ave Proposed One Line

US Sanction Paper

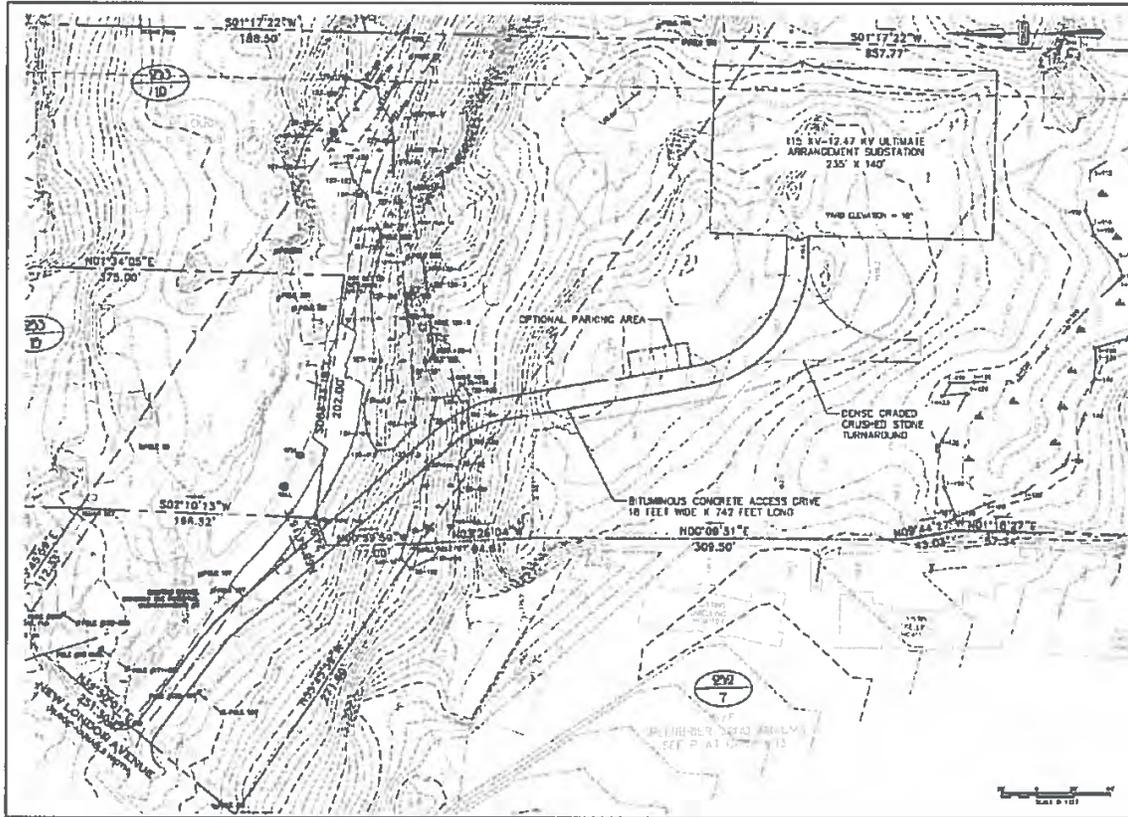


Figure 4 - New London Ave Substation Site Layout



US Sanction Paper

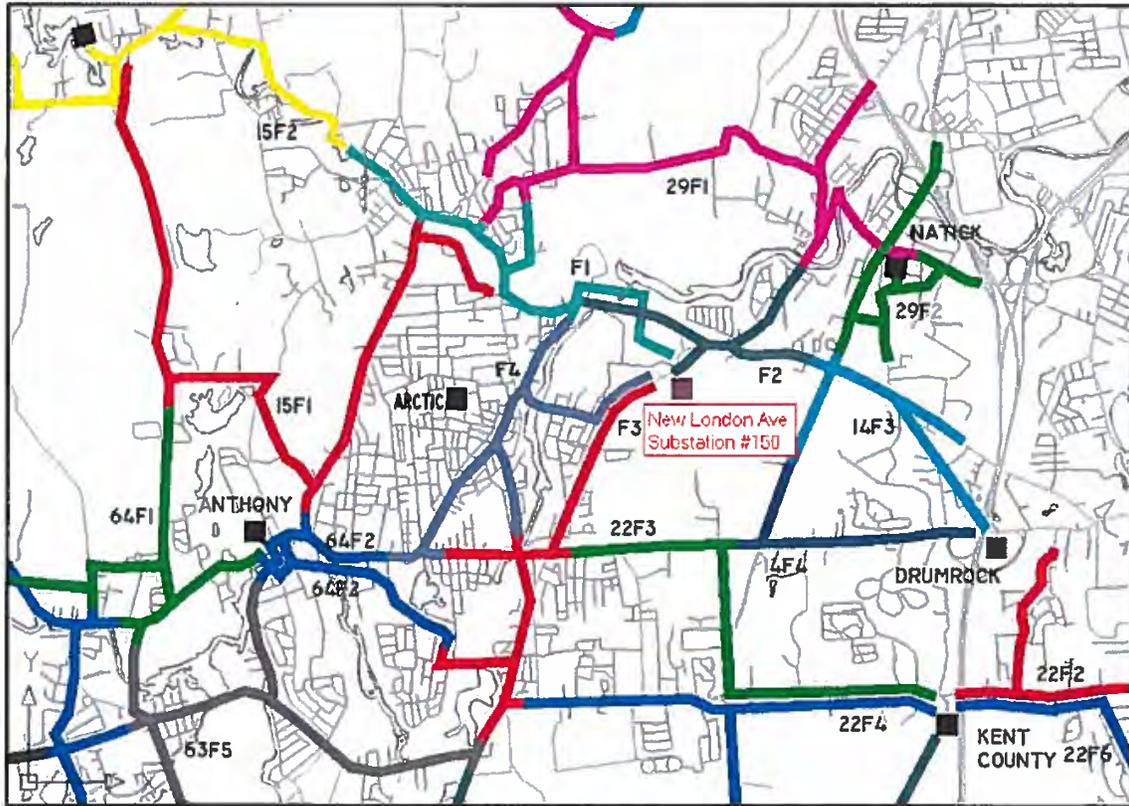


Figure 5 – Proposed 12.47kV Distribution Mainline Feeders

C028932

Recon. 0.5 Miles Segment of 2232

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|---|--|
| Fund Project Number: <u>C028932</u> | USSC #: |
| Revision: <u>3</u> | Budget Version: <u>PPM Project Authorizations</u> |
| Project Title: <u>Recon. 0.5 Miles Segment of 2232</u> | |
| Project Description: Replace the 2/0 AL on a 0.75 segment of the 2232 line on streets between Drumrock and Arctic substations with 795 kcmil AL. | |

| | |
|---|---|
| Project Status: <u>Closed</u> | |
| Responsible Person: <u>CODY, PATRICK</u> | Initiator: <u>Worme, Chris</u> |
| Spending Rationale: <u>System Capacity & Performance</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Load Relief</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>30</u> | Project Complexity Score: <u>15</u> |

Project Schedule / Expenditures

| | | | | | |
|--|-----------------------|--|-----------------------|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>11/1/2009</u> | | Est Complete Date: <u>3/31/2014</u> | | | |
| Est In-Service Date: <u>5/31/2010</u> | | | | | |
| TTD Actuals: <u>\$340,517</u> | | As Of: <u>10/2/2017</u> | | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$549,000</u> | <u>\$36,500</u> | <u>\$160,000</u> | <u>\$745,500</u> | <u>\$0</u> |

Justification / Risk Identification:

The 0.75 miles of 2/0 AL is the limiting element between Drumrock and Arctic substations. This section of the 2232 is overloaded to 103% of its SN rating and 84% of it SE rating. Under contingency loss of the 2230 line, the 2232 would be rated at 266% of the SN rating and 218% of the SE rating.

Project Scope:

Replace old unsafe poles and reconductor sections of 2/0 AL from P9212 Centerville Rd Warwick RI to P9199 Warwick RI, approximately 3000' of OH conductor

Project Alternatives Considered:

Additional Notes:

see attached document for additional info on the project

The Drumrock station work that is NEWS related work takes priority over this job. When that job is completed, this 2232 reconductor job can take place.

Related Projects:

Project Number:

Project Name:

Approvals

| | | | |
|----------------|--|--------------------------------|-----------------------------|
| Line 1: | Date <u>10/31/2012 00:00:00</u> | Approver <u>pwrconv</u> | <u>SAP Default Approver</u> |
| Line 2: | Date | Approver | |
| Line 3: | Date | Approver | |
| Line 4: | Date | Approver | |
| Line 5: | Date | Approver | |

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

Fixed - Project Estimates - Unsaved

Title
Project Number

Budget Version
Revision
Revision Status
Revision No.
Est Start Date
Est Complete Date
Est In Svc Date
Capital
Expense
Jobbing
Retirement
Removal
Total (excl. Rets.)
Credits
Net

Revision Info

Revision 3 of 5
[Find Revision](#)

Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record of 284

C032258

ACNW Vlt47 Full Rebuild Prov

5360-Narragansett Electric and Gas Project Revision Detail Report

| | |
|--|-----------------------------------|
| Fund Project Number: <u>C032258</u> | USSC #: <u>USSC-17-212</u> |
| Revision: <u>4</u> | Budget Version: |
| Project Title: <u>ACNW Vlt47 Full Rebuild Prov</u> | |
| Project Description: Install and equip one network vault, and remove one network vault. | |

| | |
|---|---|
| Project Status: <u>open</u> | |
| Responsible Person: <u>MORAN, HEATHER</u> | Initiator: <u>Livingston, Claire L</u> |
| Spending Rationale: <u>Asset Condition</u> | Funding Type: <u>P Electric Distribution Line RI</u> |
| Budget Class: <u>Asset Replacement</u> | |
| Capital by Category: | |
| Program Code: | |
| Project Risk Score: <u>42</u> | Project Complexity Score: <u>17</u> |

Project Schedule / Expenditures

| | | | | | |
|--|--|-----------------------|-----------------------|---------------------|-----------------------|
| Revision Status: <u>Approved</u> | | | | | |
| Est Start Date: <u>5/12/2009</u> | Est Complete Date: <u>9/30/2017</u> | | | | |
| Est In-Service Date: <u>6/30/2017</u> | | | | | |
| TTD Actuals: <u>\$1,457,027</u> | As Of: <u>10/2/2017</u> | | | | |
| Cost Breakdown | <u>Capital</u> | <u>Expense</u> | <u>Removal</u> | <u>Total</u> | <u>Credits</u> |
| | <u>\$947,000</u> | <u>\$116,000</u> | <u>\$434,000</u> | <u>\$1,497,000</u> | <u>\$0</u> |

Justification / Risk Identification:

Network Vault 47 on Washington Street in Providence was initially built as a single-unit vault in 1939. It was enlarged in 1972 to accommodate a second unit. The oldest part of the vault structure is deteriorated beyond repair, but cannot be removed without replacement. This project covers expenditures necessary to install and equip a new single unit vault adjacent to the existing structure, and to remove the original part of the vault. Removal and disposal must be done in accordance with EPA requirements because testing at the site indicates the vault structure is PCB contaminated. The transformer and network conductors from the location of the vault to be removed will be removed.

Project Scope:

Install one network vault structure, one mole-type secondary collector bus, 300 ft of 3-1/C-4/0 Cu 15 kV cable, 780 ft of 4-1C-500 kcmil Cu 600 V cable, 340 ft of 1C-500 kcmil Cu 600 V cable, 260 ft of 3-1/C-750 kcmil Cu 600 V cable, and miscellaneous underground and network vault equipment. Remove 215 ft of 6" Cu bus bar, 155 ft of 5" Cu bus bar, 135 ft of 3/C-1/0 PL 15 kV cable, 110 ft of 3-1/C-1/0 PL 15 kV cable, 60 ft of 3-1/C-500 kcmil Cu RL 600 V cable, one network vault structure, and miscellaneous underground and network vault equipment.

Project Alternatives Considered:

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C032258 Current Total Authorized Amount: \$1,49...

Title: ACNW Vtr47 Full Rebuild Prov
Project Number: C032258

| | |
|----------------------------|-----------------------|
| Budget Version | No Assigned Versions |
| Revision | 17-212 |
| Revision Status | Approved |
| Revision No. | 4 |
| Est Start Date | 05/12/2009 |
| Est Complete Date | 09/30/2017 |
| Est In Srvc Date | 06/30/2017 |
| Capital | \$947,000.00 |
| Expense | \$116,000.00 |
| Jobbing | \$0.00 |
| Retirement | \$0.00 |
| Removal | \$434,000.00 |
| Total (excl. Rets.) | \$1,497,000.00 |
| Credits | \$0.00 |
| Net | \$1,497,000.00 |

Revision Info: Other Updates

Revision: 4 of 4 [K] [<] [>] [>I]
[Find Revision](#) [Send for Approval]

Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare

Record 1 of 1 [K] [<] [>] [>I]

Audits

Close



Resanction Request

| | | | |
|---------------------------|--|--------------------------|---|
| Title: | Vault 47 Full Rebuild Providence RI | Sanction Paper #: | USSC-17-212 |
| Project #: | C032258 | Sanction Type: | Resanction |
| Operating Company: | The Narragansett Electric Co. | Date of Request: | 05/09/2017 |
| Author: | Roger D. Cox | Sponsor: | Carol Sedewitz, VP of Electric Asset Management |
| Utility Service: | Electricity T&D | Project Manager: | Heather L. Moran |

1 Executive Summary

This paper requests resanction of the Project C032258 in the amount \$1.497M with a tolerance of +/- 10% for the purposes of Engineering, Procurement and full construction.

This sanction amount is \$1.497M broken down into:

- \$0.947M Capex
- \$0.116M Opex
- \$0.434M Removal

Note the previous requested sanction amount was \$0.970M

2 Resanction Details

2.1 Project Summary

Network Vault 47 on Washington Street in Providence was initially built as a single-unit vault in 1939. It was enlarged in 1972 to accommodate a second unit. The oldest part of the vault structure is deteriorated beyond repair, but cannot be removed without replacement. This project covers expenditures necessary to install and equip a new single unit vault adjacent to the existing structure, and to remove the original part of the vault. Removal and disposal must be done in accordance with EPA requirements because testing at the site indicates the vault structure is PCB-contaminated. The transformer and network protector from the portion of the vault to be removed will be re-used in the new structure. The 1972-portion of the vault will remain; the roof will be replaced in that portion due to deterioration.

Project will install one network vault structure, one mole-type secondary collector bus, 300 ft of 3-1/C-4/0 Cu 15 kV cable, 780 ft of 4-1C-500 kcmil Cu 600 V cable, 340 ft of 1C-500 kcmil Cu 600 V cable, 260 ft of 3-1/C-750 kcmil Cu 600 V cable, and miscellaneous underground and network vault equipment. Remove 215 ft of 6" Cu bus bar, 155 ft of 5" Cu bus bar, 135 ft of 3/C-1/0 PL 15 kV cable, 110 ft of 3-1/C-1/0 PL 15 kV cable, 60 ft of 3-1/C-500 kcmil Cu RL 600 V cable, one network vault structure, and miscellaneous underground and network vault equipment.



Resanction Request

2.2 Summary of Projects

| Project Number | Project Type (Elect only) | Project Title | Estimate Amount (\$M) |
|----------------|---------------------------|-------------------------------|-----------------------|
| C032258 | Distribution Line | Vault 47 Full Rebuild Prov RI | 1.497 |
| Total | | | 1.497 |

2.3 Prior Sanctioning History

| Date | Governance Body | Sanctioned Amount | Potential Project Investment | Paper Title | Sanction Type | Paper Reference Number | Tolerance |
|---------|-----------------|-------------------|------------------------------|-------------|---------------|------------------------|-----------|
| 3/07/14 | Power Plant | \$0.970M | \$0.970M | NA | Sanction | NA | +50/-25% |
| 5/14/09 | Power Plant | \$0.025M | \$0.025M | NA | Sanction | NA | +200/-50% |

Over / Under Expenditure Analysis

| Summary Analysis (\$M) | Capex | Opex | Removal | Total |
|------------------------|-------|-------|---------|-------|
| Resanction Amount | 0.947 | 0.116 | 0.434 | 1.497 |
| Latest Approval | 0.590 | 0.070 | 0.310 | 0.970 |
| Change* | 0.357 | 0.046 | 0.124 | 0.527 |

*Change = (Re-sanction – Amount Latest Approval)

2.4 Cost Summary Table

| Project Number | Project Title | Project Estimate Level (%) | Spend (\$M) | Prior Yrs | Current Planning Horizon | | | | | | Total | |
|-------------------------------|-------------------------------|----------------------------|-------------|-----------|--------------------------|-------|-------|-------|-------|---------|-------|-------|
| | | | | | Yr. 1 | Yr. 2 | Yr. 3 | Yr. 4 | Yr. 5 | Yr. 6 + | | |
| C032258 | Vault 47 Full Rebuild Prov RI | +/- 10% | CapEx | 0.654 | 0.293 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.947 |
| | | | OpEx | 0.072 | 0.044 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.116 |
| | | | Removal | 0.400 | 0.034 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.434 |
| | | | Total | 1.126 | 0.371 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.497 |
| Total Project Sanction | | | CapEx | 0.654 | 0.293 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.947 |
| | | | OpEx | 0.072 | 0.044 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.116 |
| | | | Removal | 0.400 | 0.034 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.434 |
| | | | Total | 1.126 | 0.371 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.497 |



Resanction Request

2.5 Business Plan

| Business Plan Name & Period | Project included in approved Business Plan? | Over / Under Business Plan | Project Cost relative to approved Business Plan (\$) |
|---------------------------------------|---|---|--|
| FY18-22 NE Distribution Business plan | <input type="radio"/> Yes <input checked="" type="radio"/> No | <input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> N/A | \$0.371M |

2.6 Drivers

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

| Detail Analysis (M's) | Over/Under Expenditure? | Amount |
|------------------------------------|---|---------|
| Additional Design/Engineering Cost | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.082 |
| Additional Construction Costs | <input checked="" type="checkbox"/> Over <input type="checkbox"/> Under | \$0.445 |

2.6.2 Explanation of Key Variations

Ventilation system:

- This downtown vault had a required forced ventilation system as it could not utilize a simple grate venting system. The original estimate assumed forced vent system materials that were standard at that time. The actual installation used explosion proof design which was the first installation in the NE system. This increased engineering, material, & labor costs. After design but before construction, the RI standards changed requiring any vault that requires the installation of forced ventilation, also require that the ventilation system installed to meet the new explosion proof standard.

Precast network vault roofs

- This was the first installation of solid network vault hatch covers, or prefabricated concrete vault sections, in the System. Increased engineering & design costs.